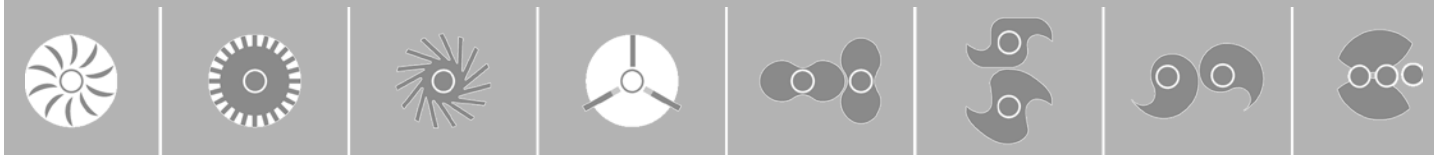


Company. Brand. Products.

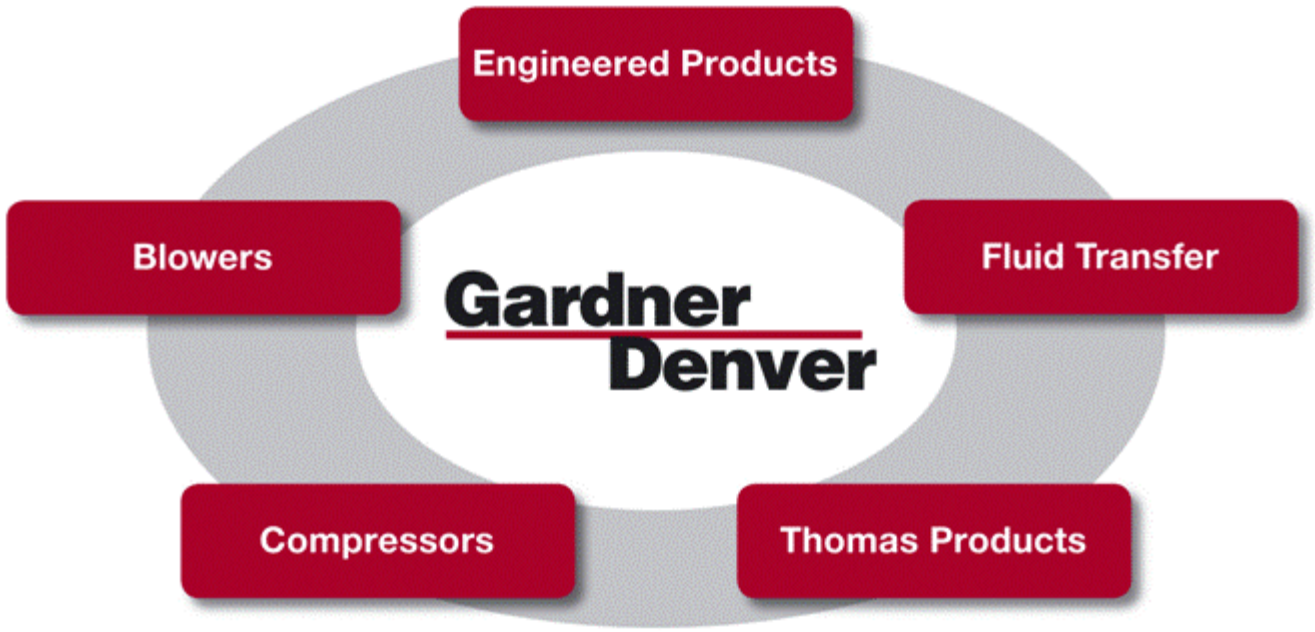
Gardner Denver

1. Company details

Who is Gardner Denver?

- **Globally renowned supplier of compressed air and gas, vacuum and fluid transfer products**
- **Founded in 1859**
- **Headquartered in Quincy, Illinois (USA)**
- **Listed as GDI at NYSE**
- **More than 6,000 employees**

Gardner Denver Divisions



Global brands

- **Champion**
- **Nash**
- **Thomas**
- **Emco Wheaton**
- **Drum**
- **Wittig**
- **CycloBlower**
- **DuroFlow**
- **TODO**

and now

- **Elmo Rietschle**

Introduction

Within the Gardner Denver Group are many famous vacuum pump, blower and compressor manufacturers.

Rietschle (Germany)

Elmo (Germany)

Nash (USA)

Wittig (Germany)

Sutorbilt (USA)

Tamrotor (Finland)

Hoffman (USA)

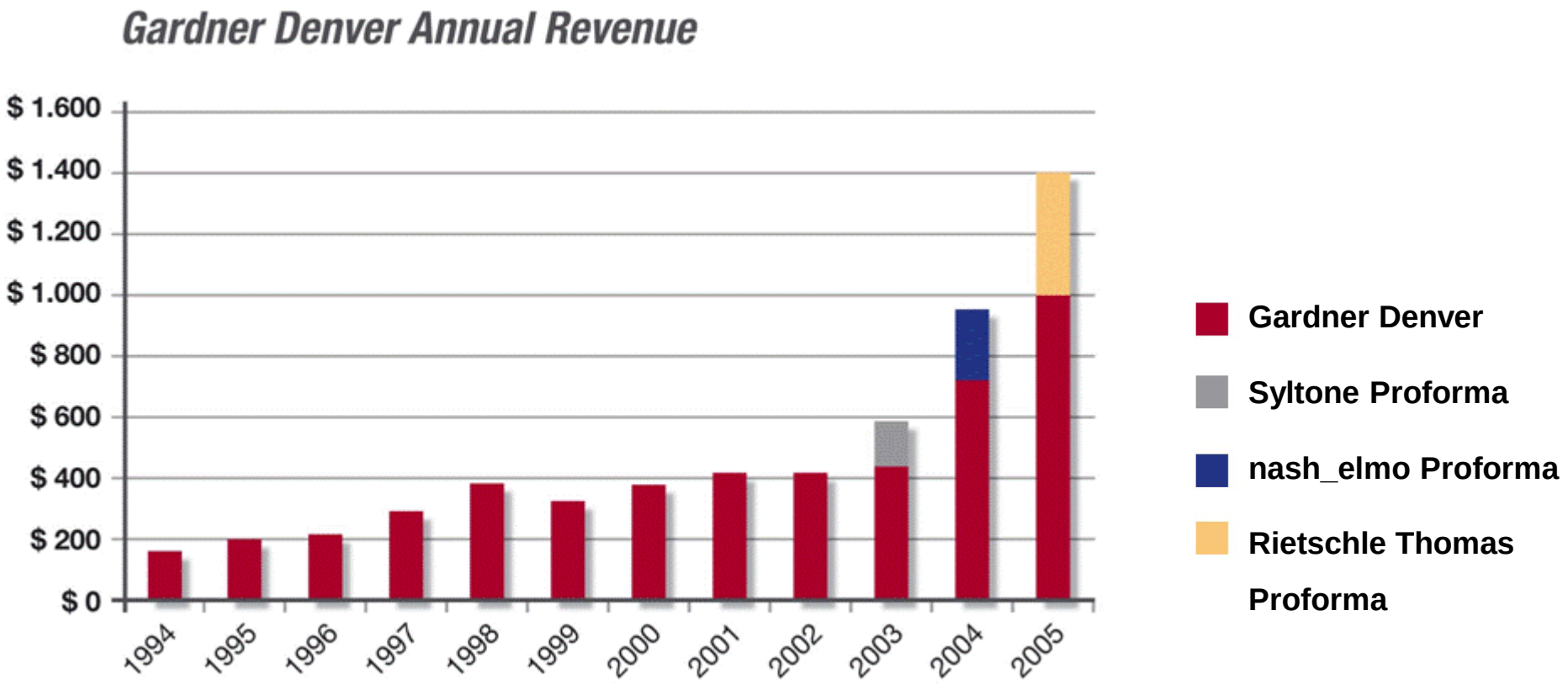
Lamson (USA)

Belliss & Morcom (UK)

Syltone (UK)

Compare (UK)

Annual Revenue



The History of Gardner Denver

1927
Merger with
Denver Rock Drill

1979 Take-over by Cooper

1859
Founded by
Robert Gardner

Independent since 1994

Introduction

Elmo Rietschle is a new brand name within the Gardner Denver Group and was formed by merging the products of Elmo (formerly Siemens Elmo) and Rietschle. Both of these are long established German vacuum pump and blower manufacturers.

The two companies

Gardner Denver Deutschland GmbH

and

Gardner Denver Schopfheim GmbH

design, build and sell, under the roof of Gardner Denver, pumps and compressors as the new

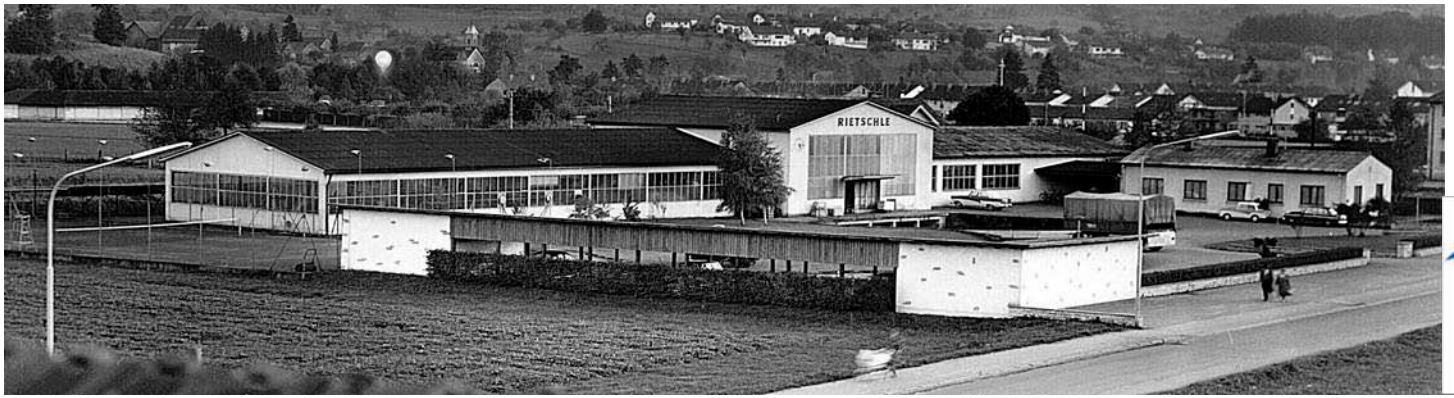
Elmo Rietschle

brand which was born from two renowned names in the industry: Elmo (formerly Siemens) and Rietschle.

Rietschle: 60 years of success

Gardner Denver

- **1950 Founded by Werner Rietschle**
- **1960 Light metal foundry**
- **2002 Fusion with Thomas Industries**
- **2006 Gardner Denver Schopfheim**

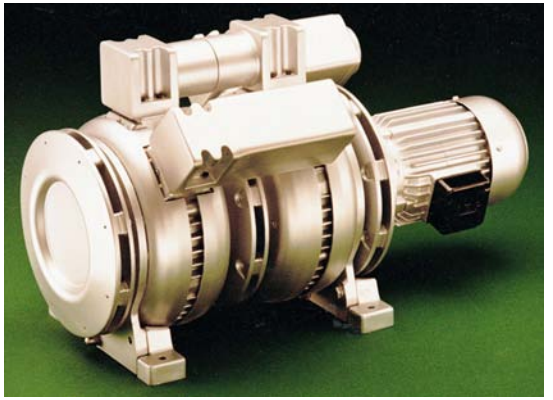


WERIE Rietschle

Rietschle Thomas
A Thomas Industries Company

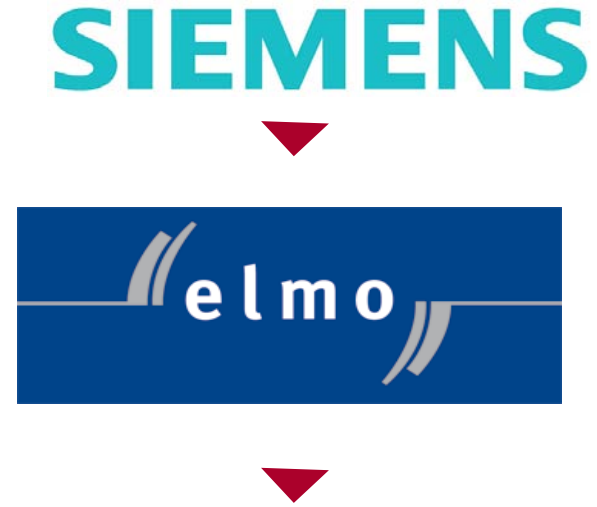
Rietschle Highlights

- **1950 oil-lubricated rotary vane**
- **1960 dry-running rotary vane**
- **1980 System solutions**
- **1998 Claw pumps and compressors**
- **2005 Screw pumps and compressors**



Elmo – a strong brand

- For more than 100 years Elmo was part of Siemens
- 2000 elmo vacuum technology
- 2002 merger with Nash to form nash_elmo
- 2004 acquired by Gardner Denver
- 2007 Gardner Denver Deutschland



Elmo wrote industrial history

- **1903 First liquid ring vacuum pump**
- **1906 First vacuum cleaner using an Elmo pump**
- **1960 First side channel blower**

Gardner Denver

2. Manufacturing

More than 30 manufacturing and service locations worldwide

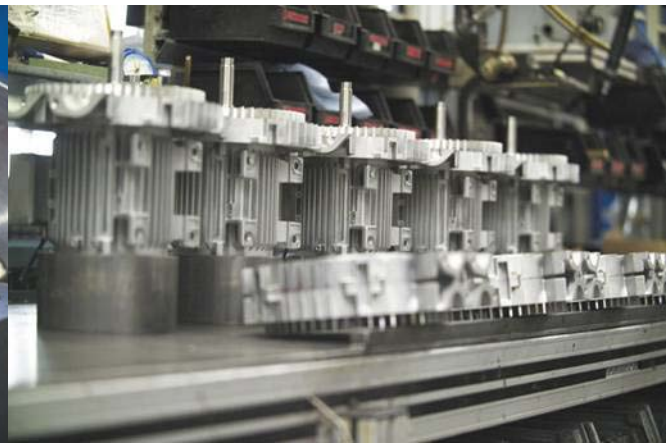
Gardner Denver

Manufacturing facilities in

- **Schopfheim**
- **Fahrnau**
- **Bad Neustadt**
- **Wuxi (China)**

Top quality manufacturing sites

Gardner Denver



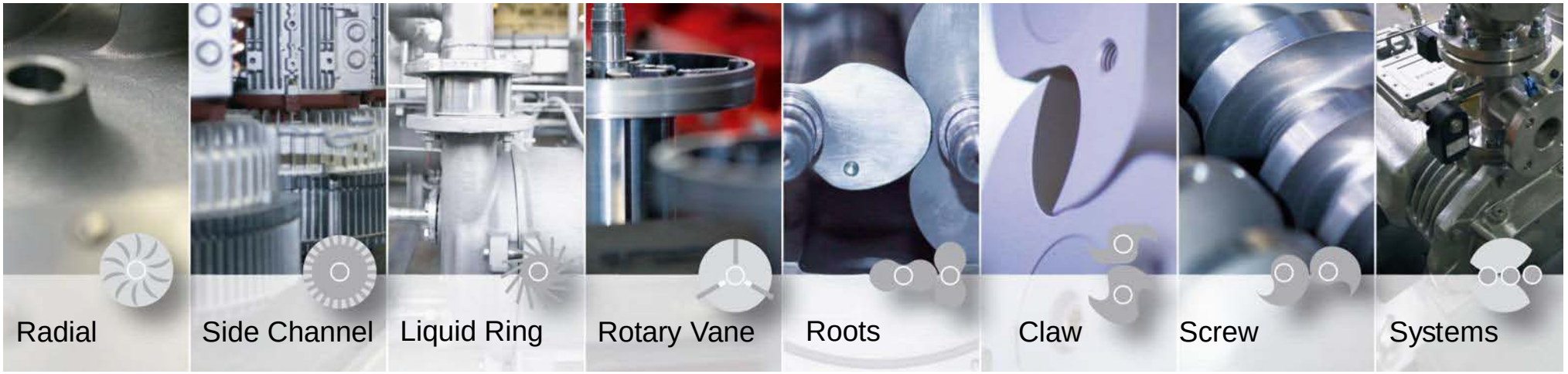
Gardner Denver

Product Series 3.

Product Series

Gardner Denver

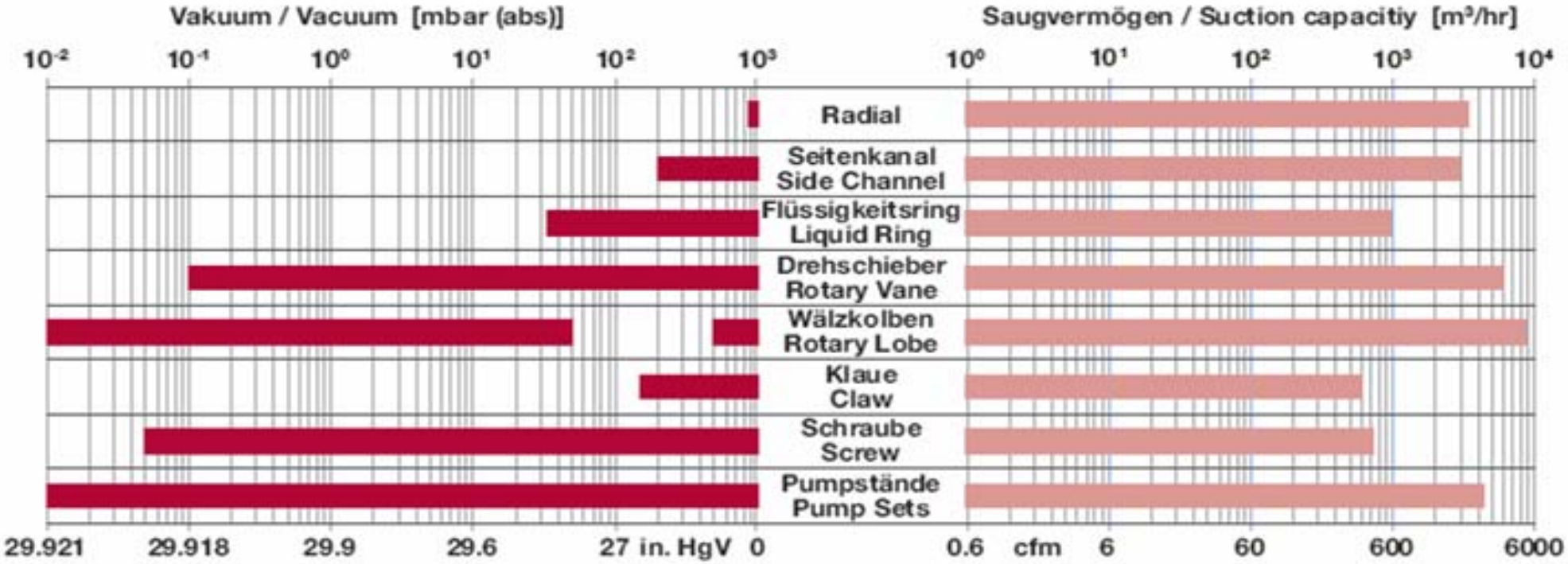
F-Series G-Series L-Series V-Series R-Series C-Series S-Series X-Series



Performance Ranges I

Gardner Denver

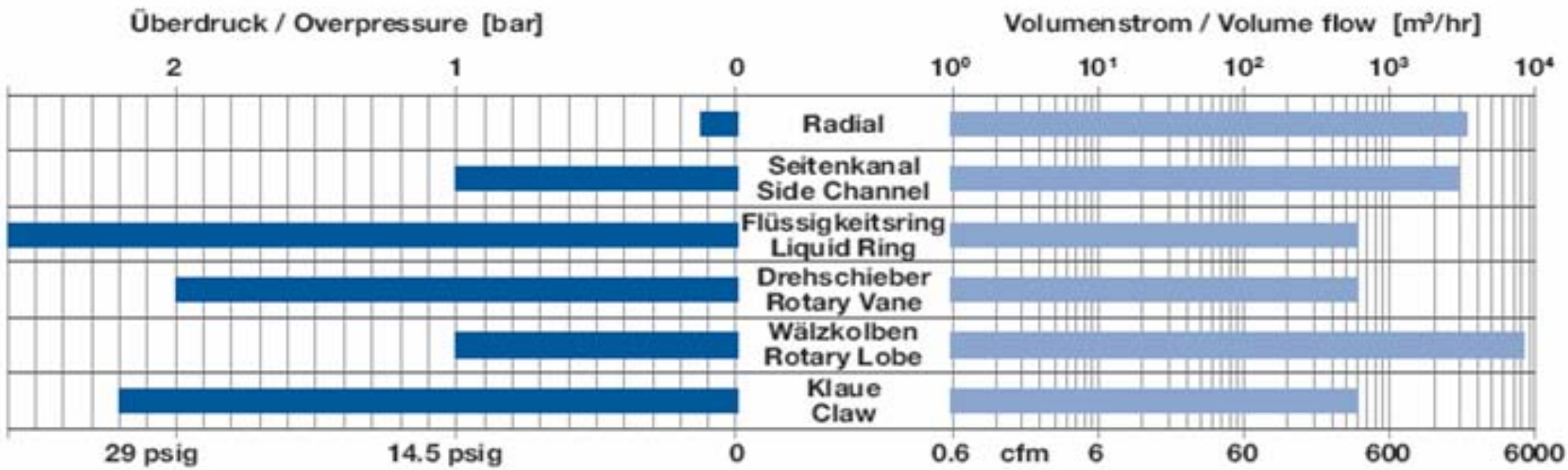
Vacuum Pumps



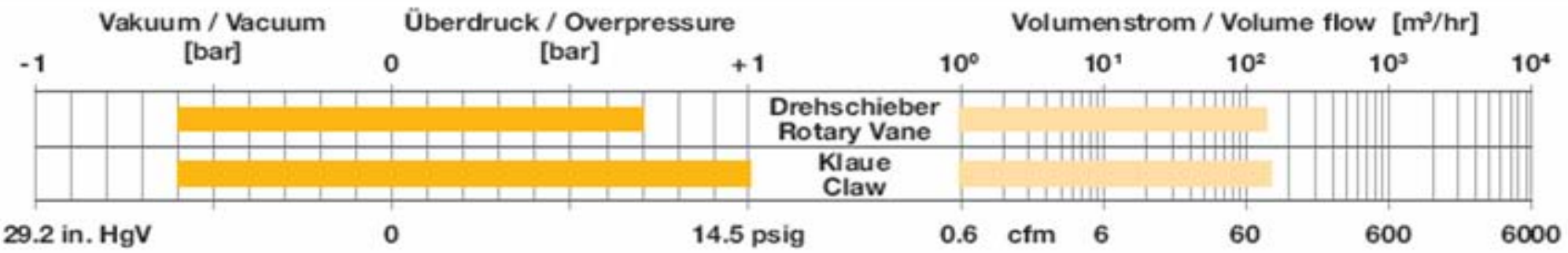
Performance Ranges II

Gardner Denver

Compressors



Pressure-Vacuum Pumps



F-Series: Radial

Cast housings and impellers

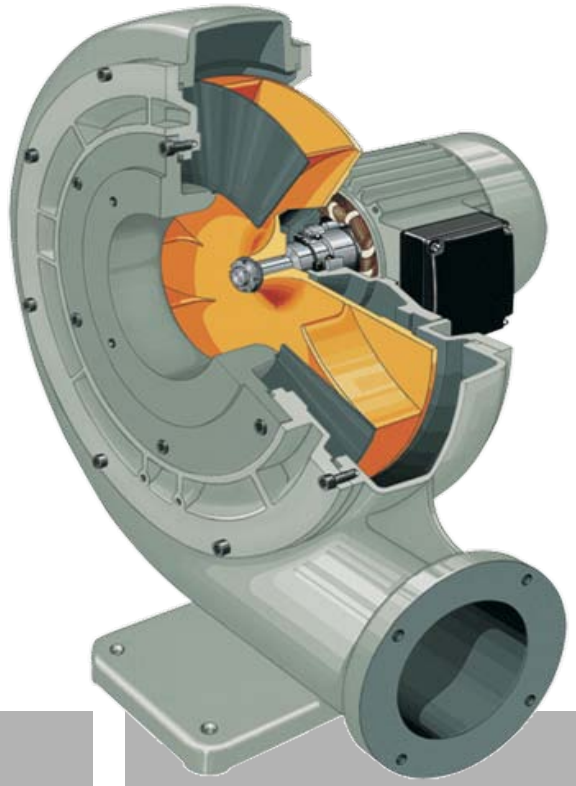
Robust and economical

Bearings greased „for life“

Quiet and vibration-free

Process safe and reliable

Frequency control available



F-Series: Radial

Main industries and applications

General industrial

Food- and Non-Food-Packaging

Printing

Woodworking

Environmental

Refrigeration and air conditioning

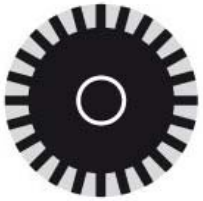
Ventilation

Textile industry

Pneumatic conveying

G-Series: Side Channel

Gardner Denver



Dry and contact-free compression

Low noise, reliable, built to last

Global Use (UL-/CSA-, IEC/EN certifications)

50/60-Hz voltage range motors

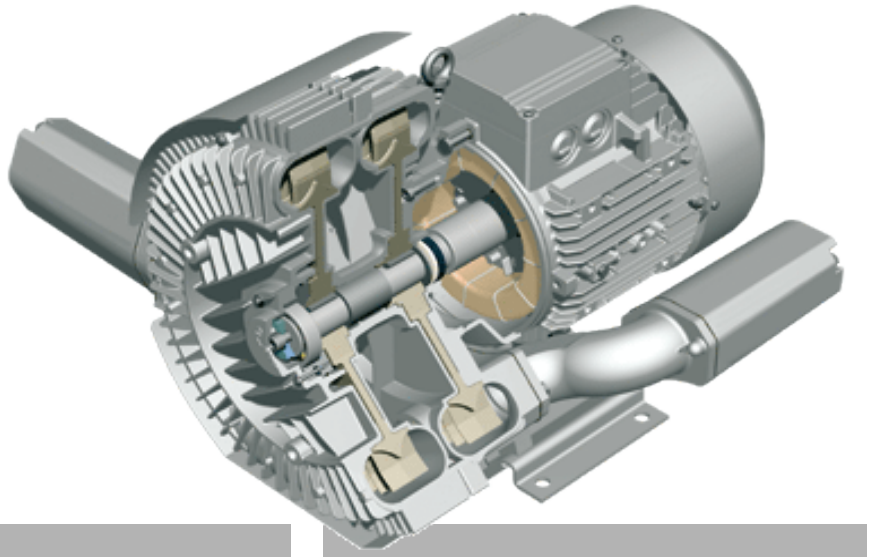
Any axial orientation

Frequency control available

Robust yet lightweight

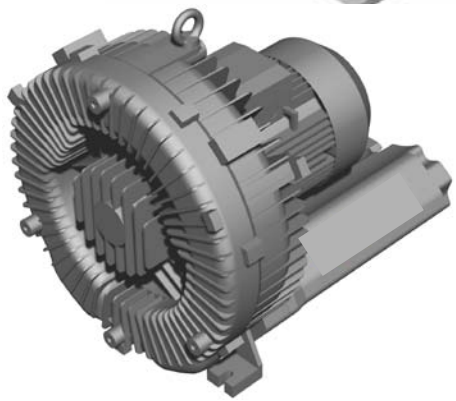
Virtually maintenance-free

ATEX 94/9 EG



G-Series – Core line

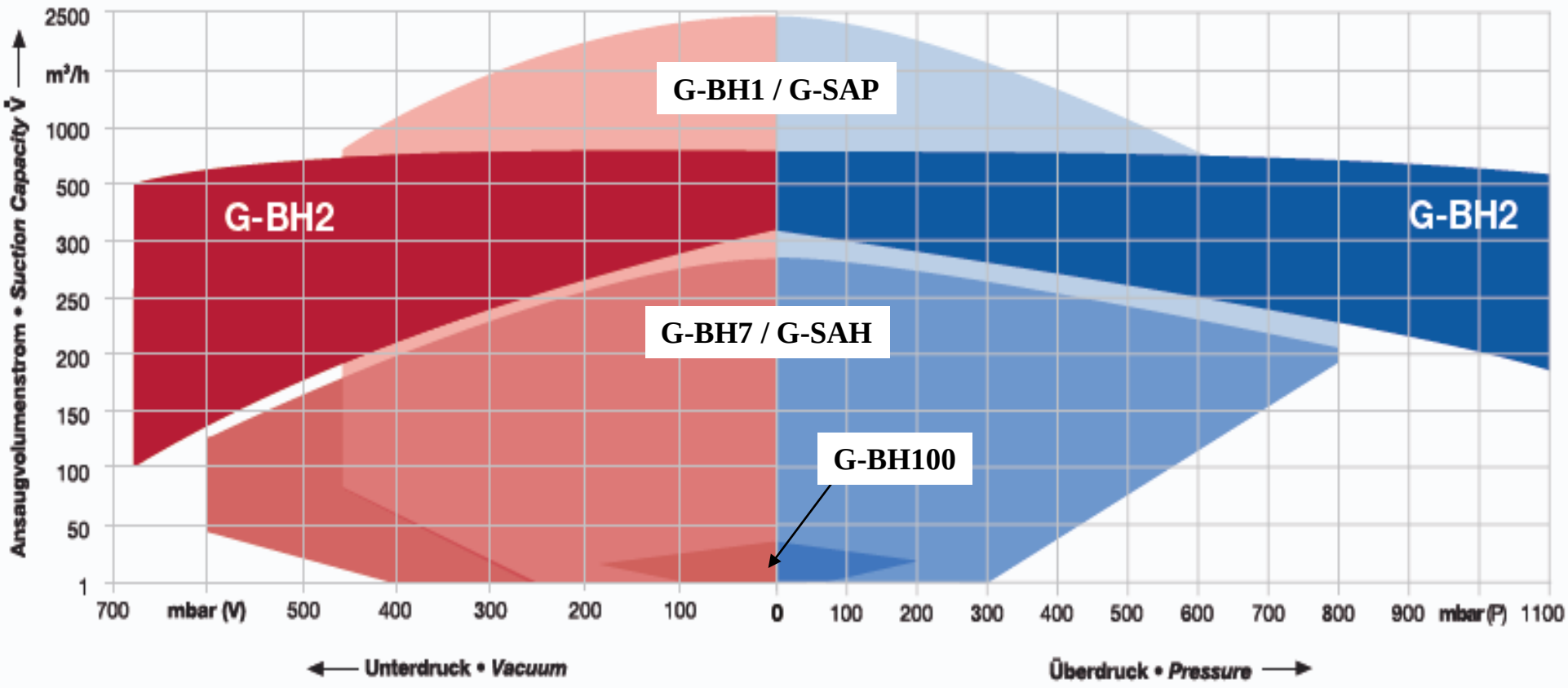
Gardner Denver



G-Series - Performance range

Gardner Denver

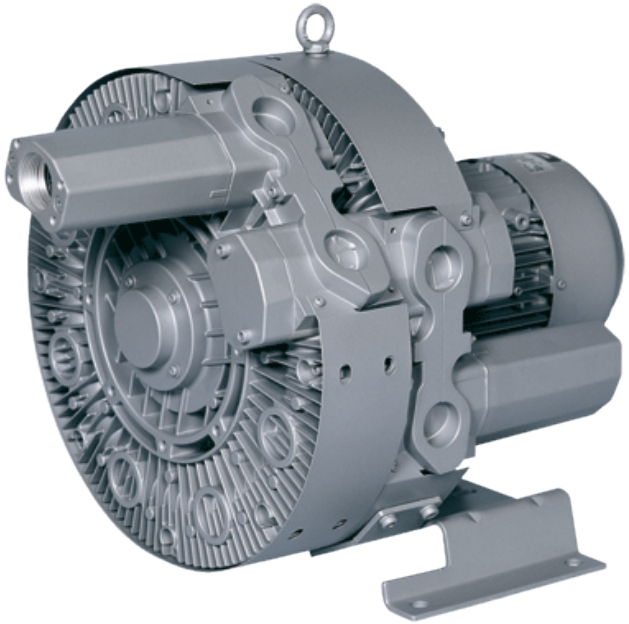
Performance



G-Series: Side Channel

Main industries and applications

- **Pneumatic conveying**
- **Packaging**
- **Pick and place**
- **Paper processing**
- **Environmental, soil remediation**
- **Drying out buildings**
- **Textile**
- **Dental vacuum**
- **Industrial vacuum cleaners**
- **Thermoforming**
- **Fishpond ventilation**



L-Series: Liquid Ring

Gardner Denver

Very low noise level

Water consumption exceptionally low

Small and compact design

Safe conveying of steam and liquids

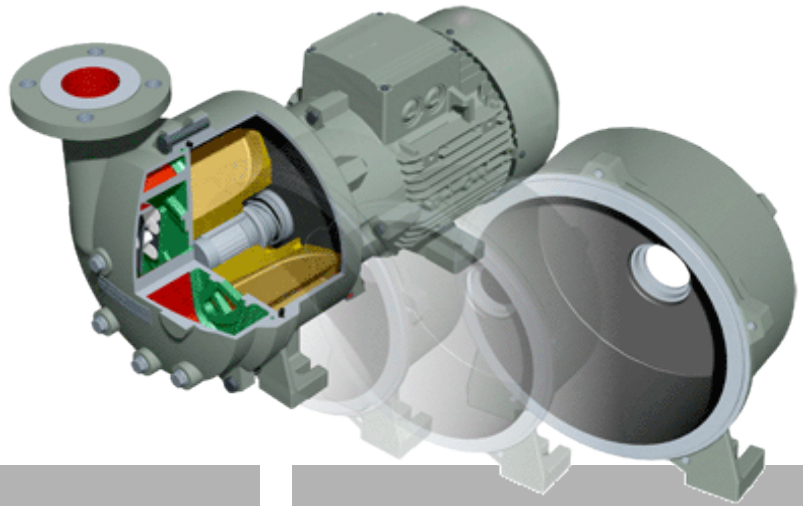
Integrated cavitation protection

High efficiency

Worldwide use (UL-/CSA)

Ceramic coating

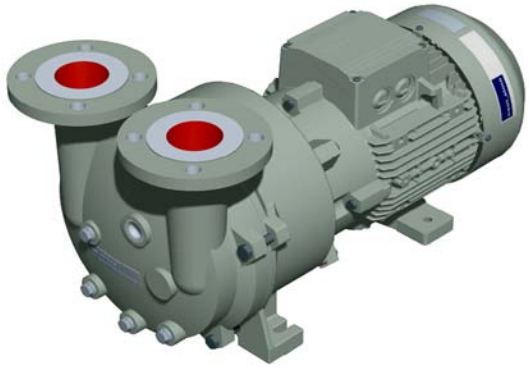
Robust and built to last



L-Series: Liquid Ring

L-BV7

L-BV5

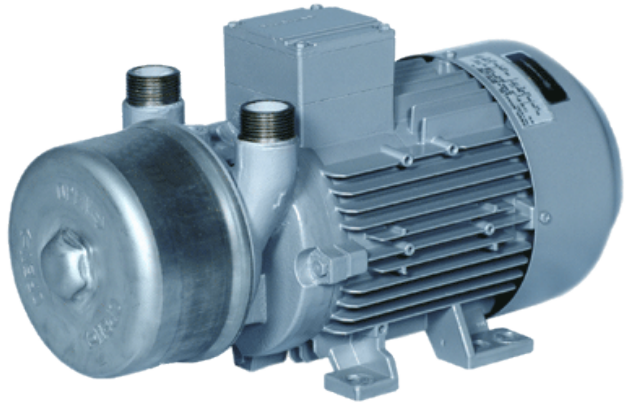


Main applications and industries

- **Food and beverage**
- **Plastics**
- **Ceramics**
- **Packaging**
- **Environmental**
- **Medical**

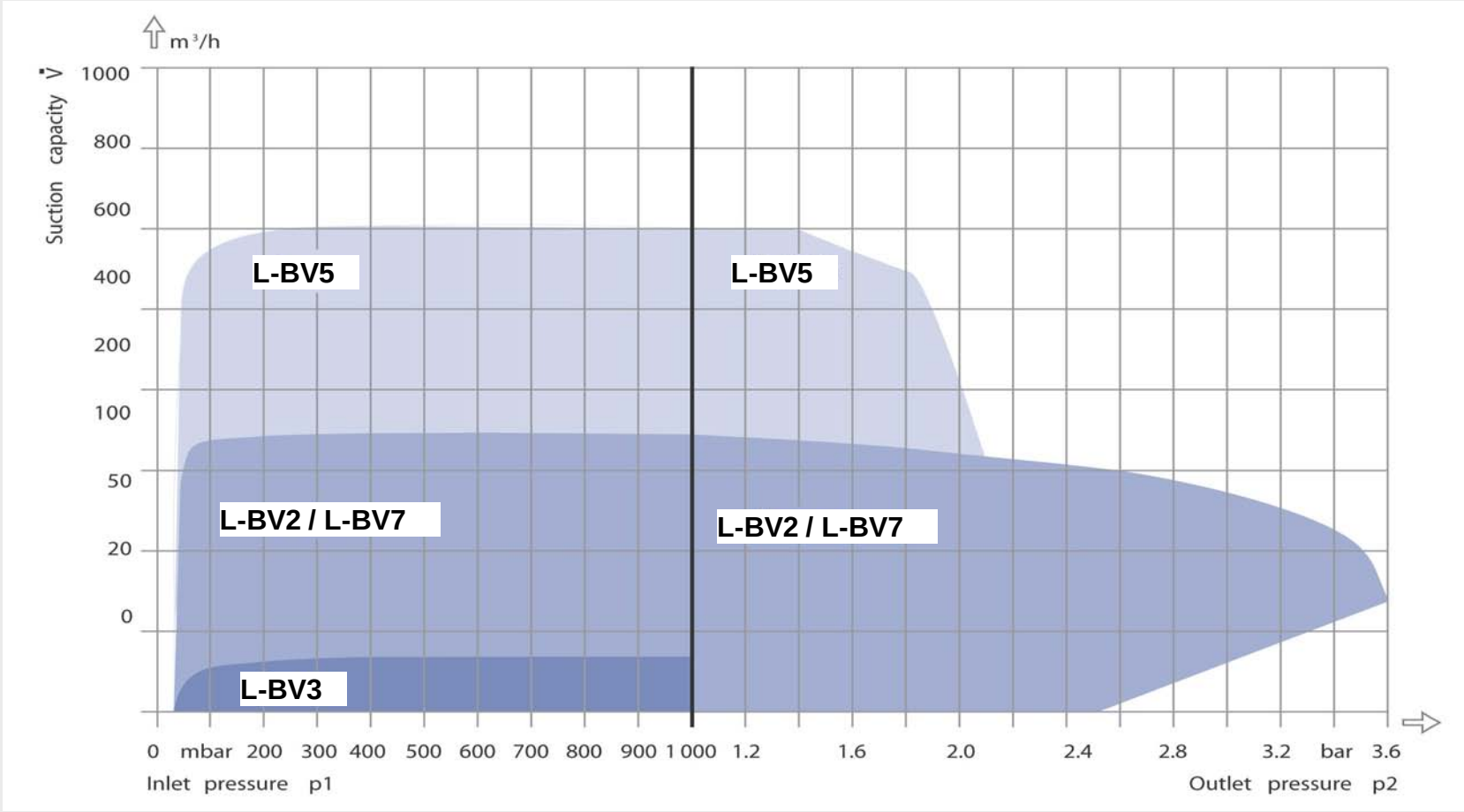
L-BV3

L-BV2



L-Series

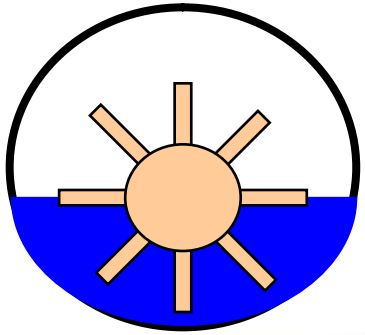
Performance ranges L-BV3 to L-BV5



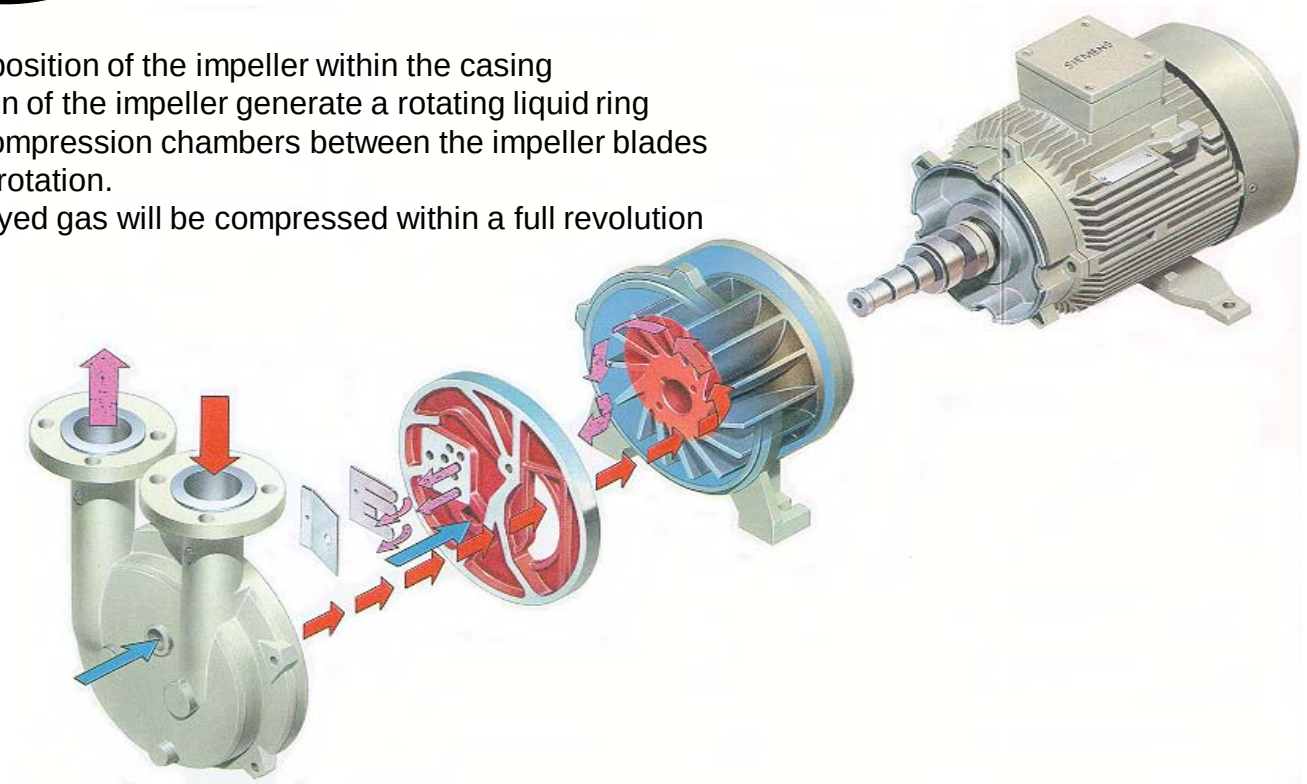
L-Series

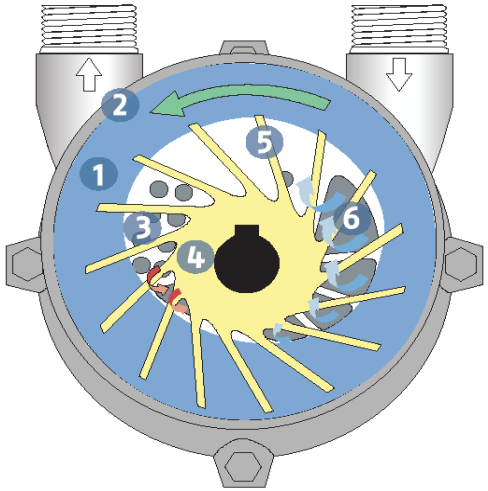
Functional principle of a liquid ring pump

Gardner Denver



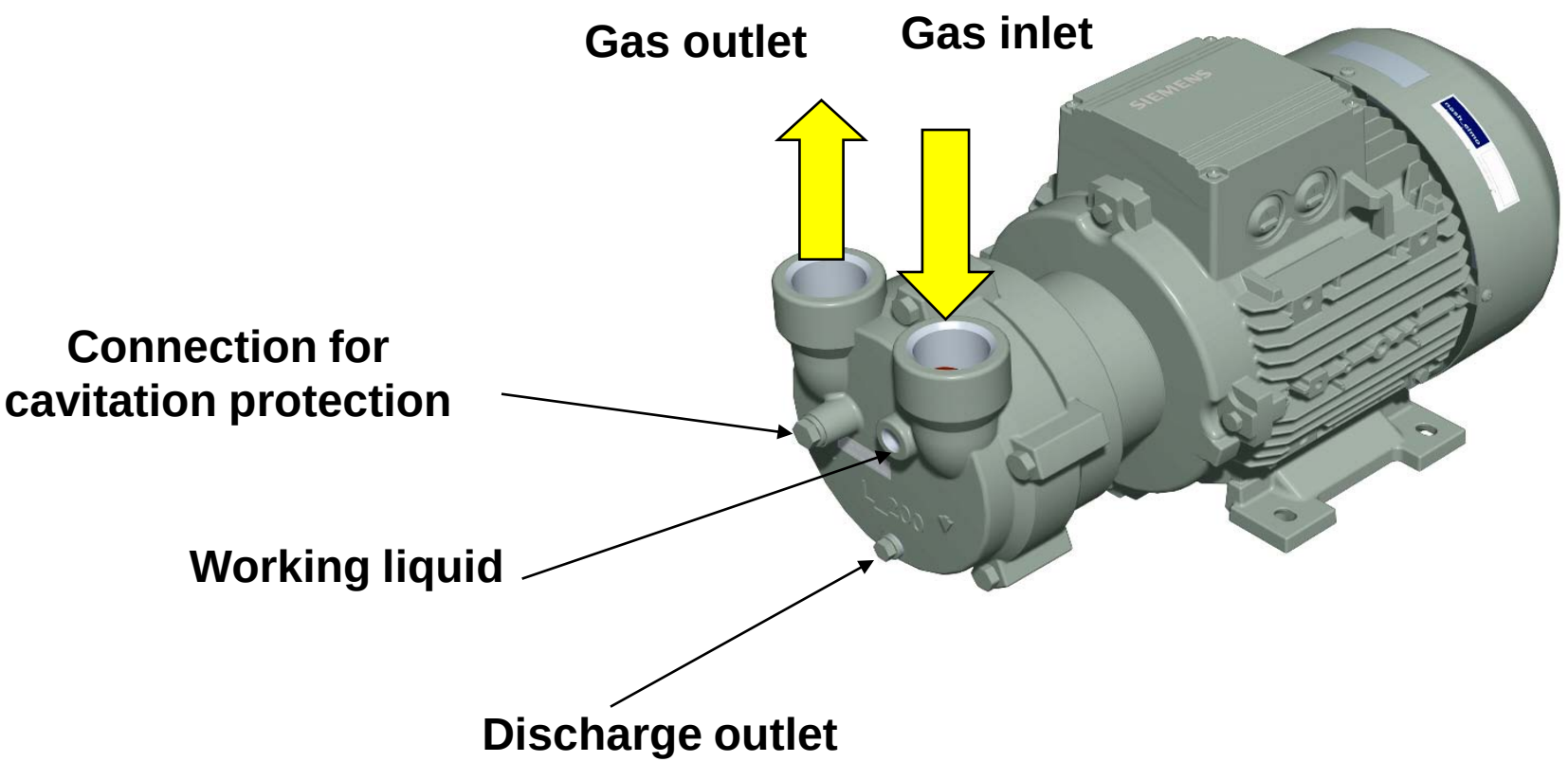
- Eccentric position of the impeller within the casing
- The rotation of the impeller generate a rotating liquid ring
- Variable compression chambers between the impeller blades during the rotation.
- The conveyed gas will be compressed within a full revolution





① operating liquid
② housing
③ discharge port
④ impeller shaft
⑤ impeller blade
⑥ suction port

L-BV2 – connection

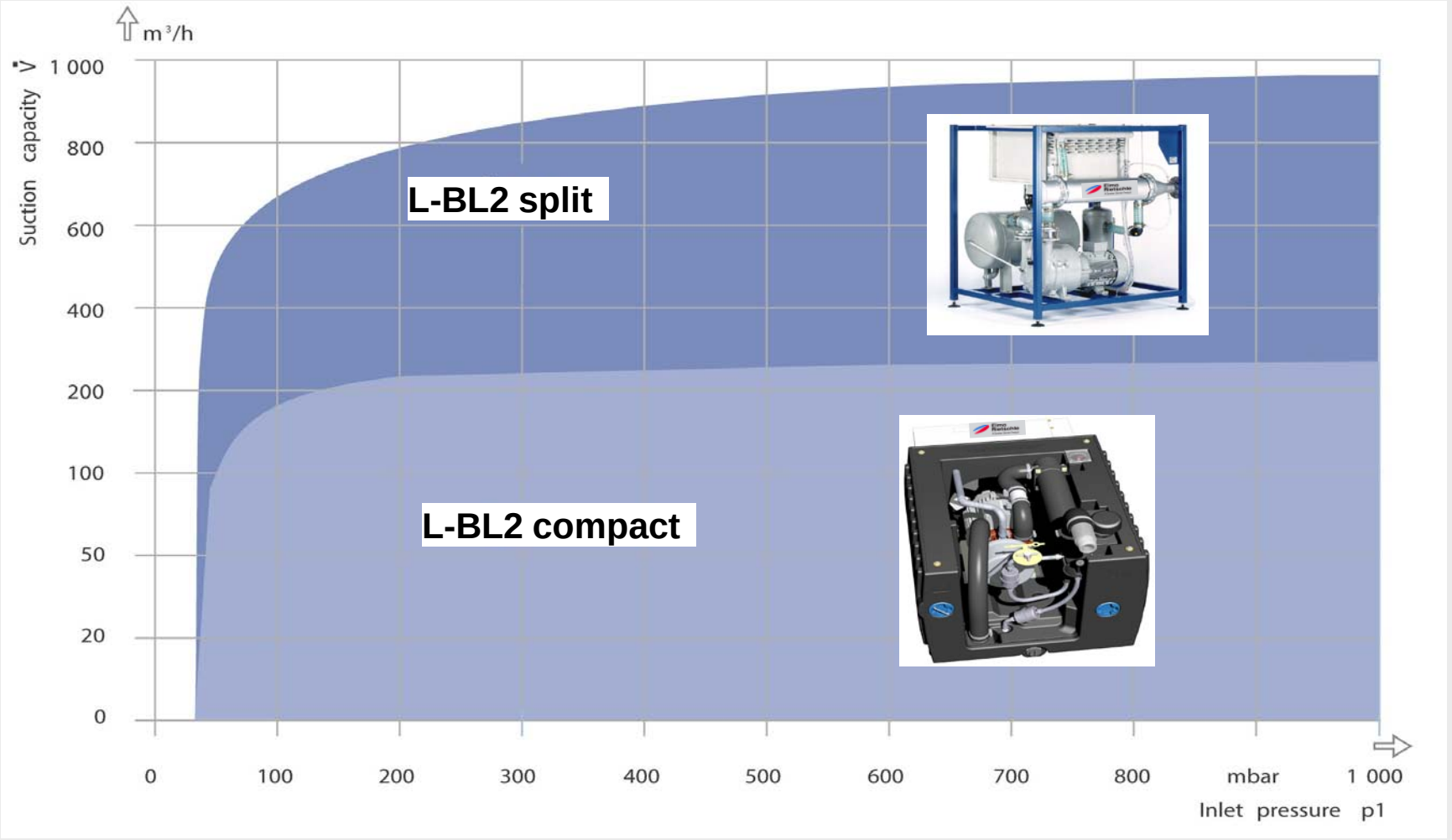


L-BL2

L-BL2 split

L-BL2 compact

L-BL2: Performance range

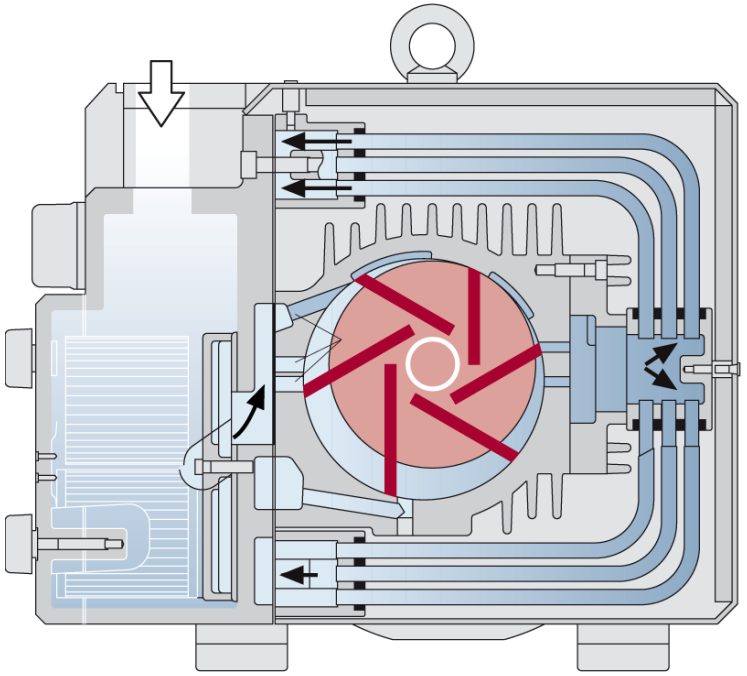


V-Series: Rotary Vane

Gardner Denver

Dry running

- **Low noise level**
- **Environmentally friendly (no oil)**
- **Low maintenance costs**
- **Robust and economical**
- **Easy to install and use**
- **Long up-times**



V-Series: Rotary Vane

Main applications and industries

Chemical and pharmaceutical

Printing (pre-press, press and post-press)

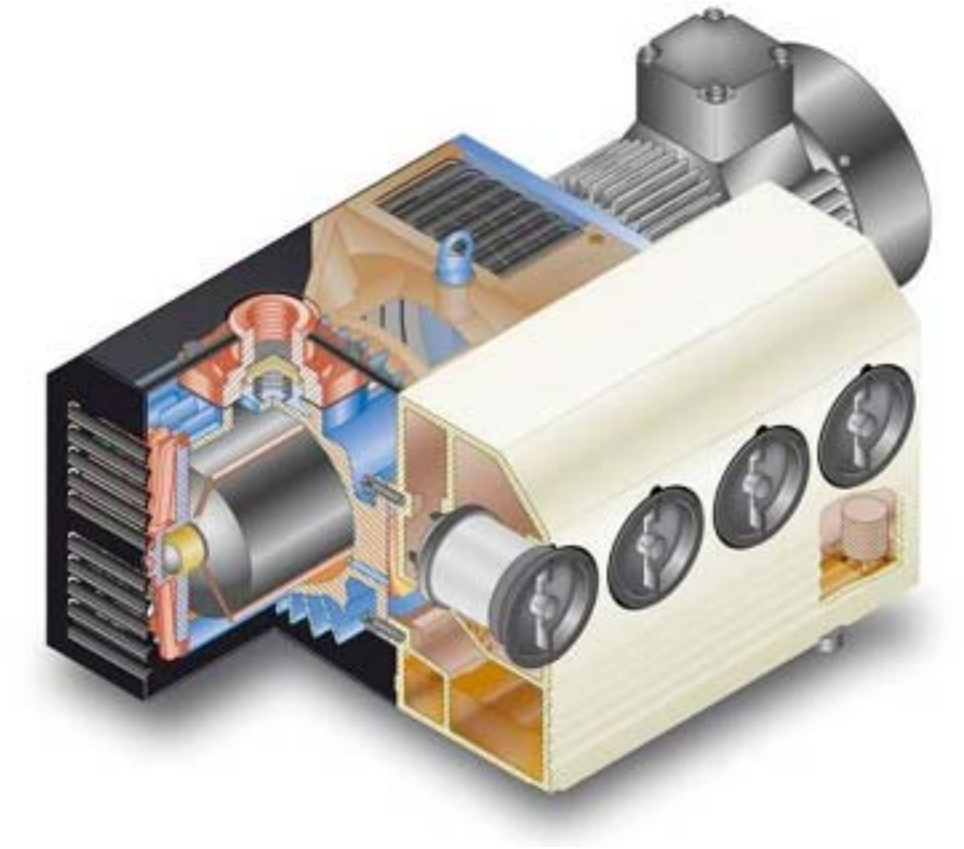
Food and beverage

Pneumatic conveying

Environmental

Woodworking

Oil Lubricated Rotary Vane Vacuum Pumps

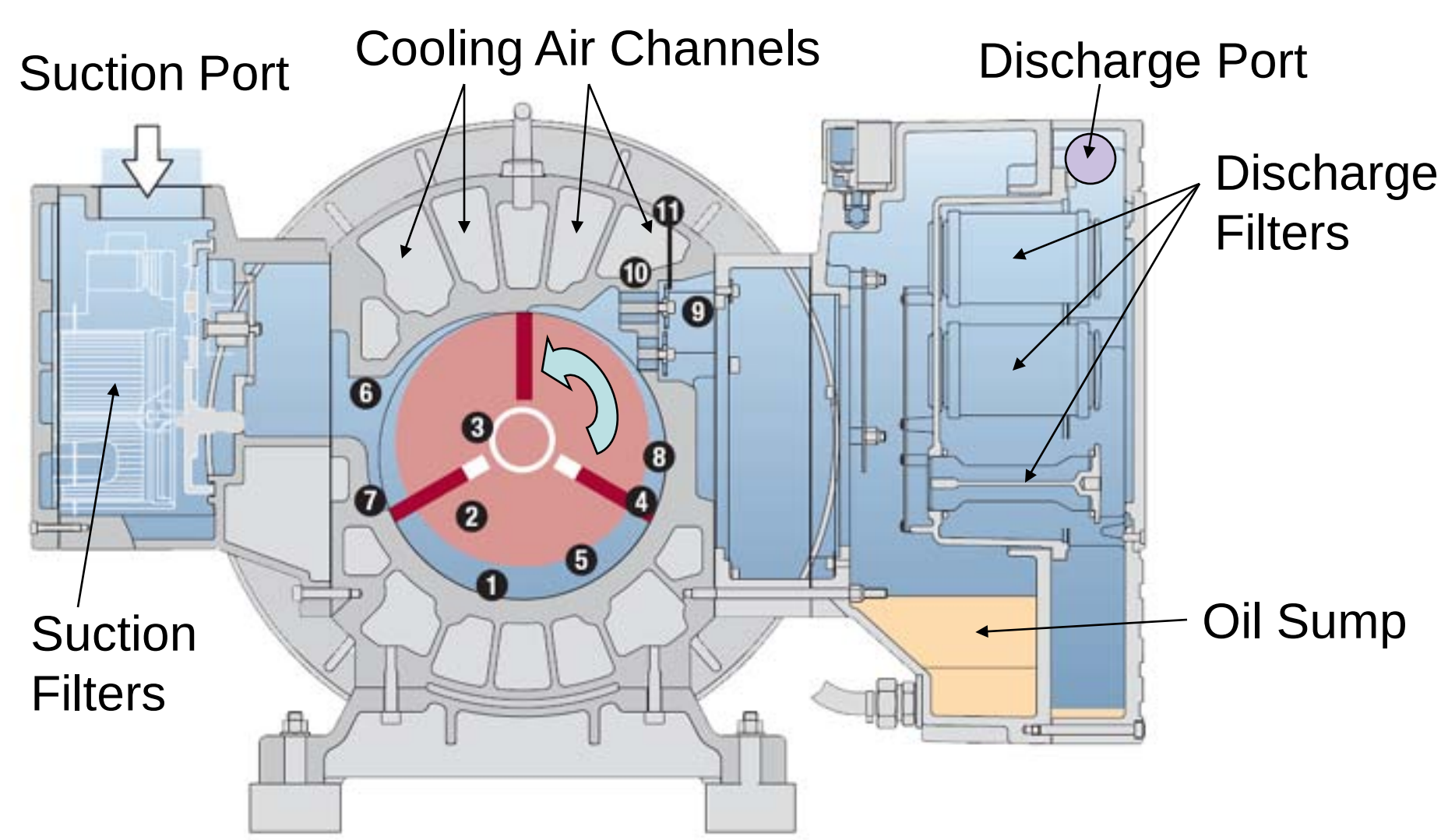


Elmo Rietschle rotary vane vacuum pumps have been continuously produced and developed since 1955.

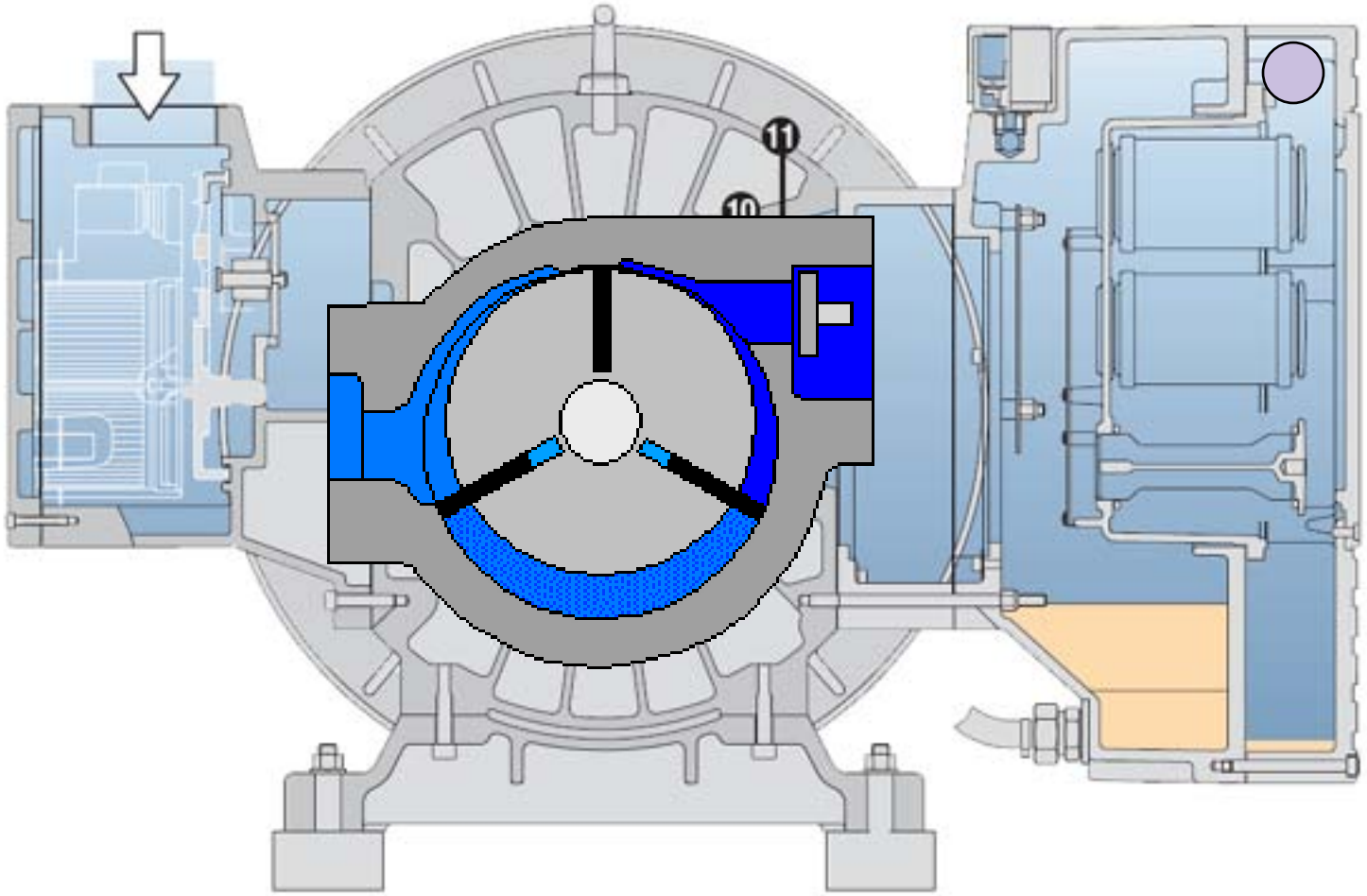
They are in use globally in a wide variety of applications.

The principle of operation is very simple.

VC Vacuum Pump Cross Section



VC Vacuum Pump Cross Section



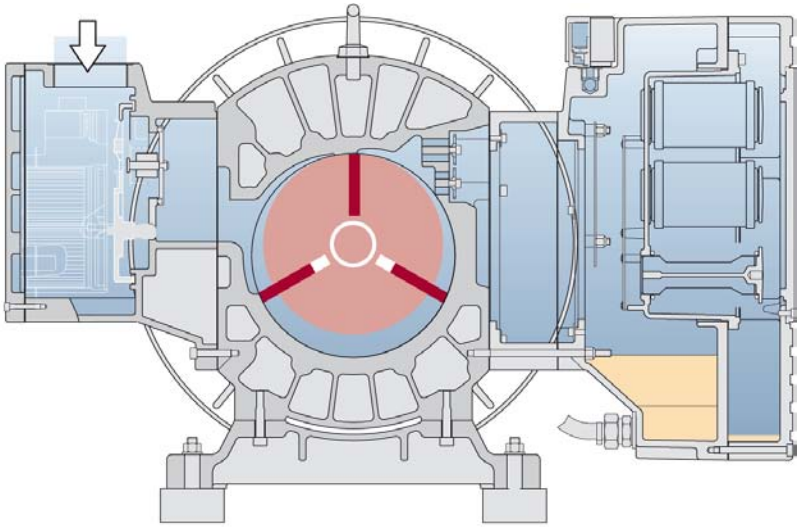
Large pumps, 400 m^3/hr and over, run at low speed.

960 rpm @ 50 Hz

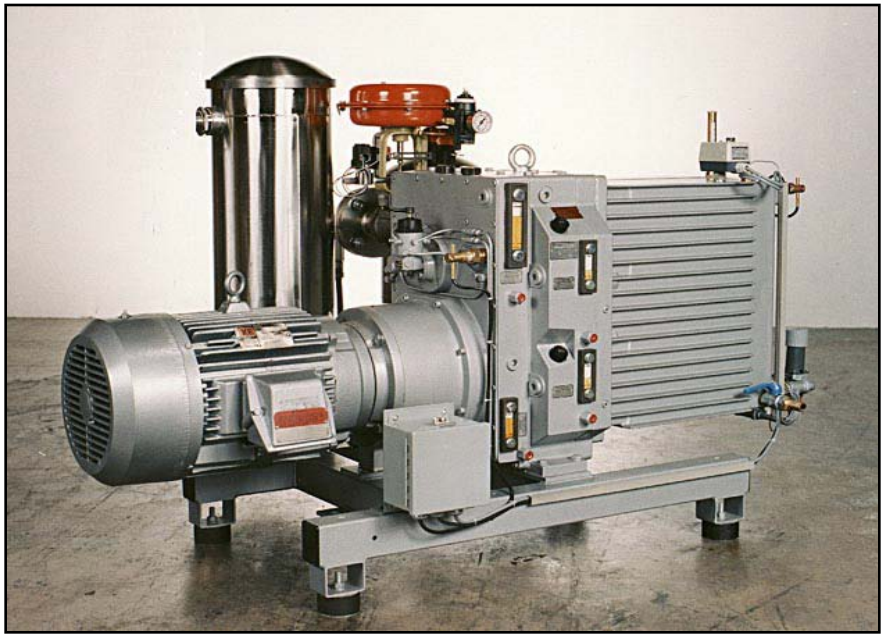
V-Series: Rotary Vane

Oil-lubricated

- **Blades with long service life**
- **Optimised oil-water separation**
- **High water vapour capabilities**
- **Low noise level**
- **Easy to maintain**
- **Long up-times**



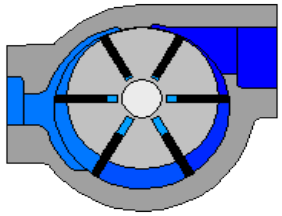
ONCE THROUGH OIL (OTO) LUBRICATED ROTARY VANE VACUUM PUMPS.



OTO rotary vane vacuum pumps designed for process applications.

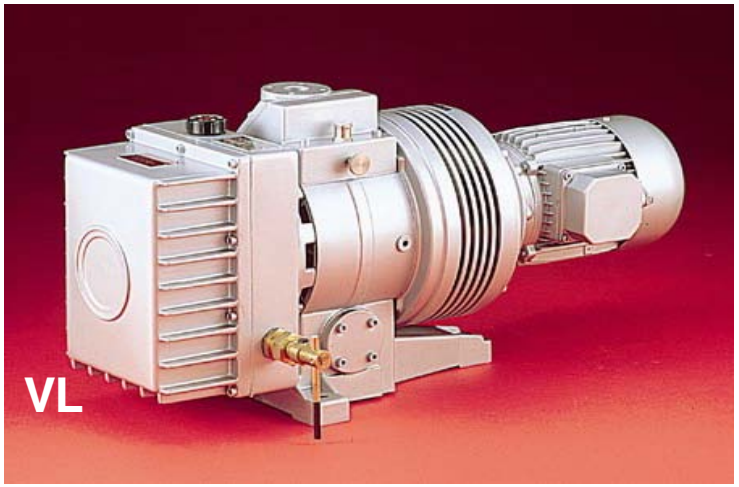
They are in service worldwide, over 1000 in use in a broad range of applications.

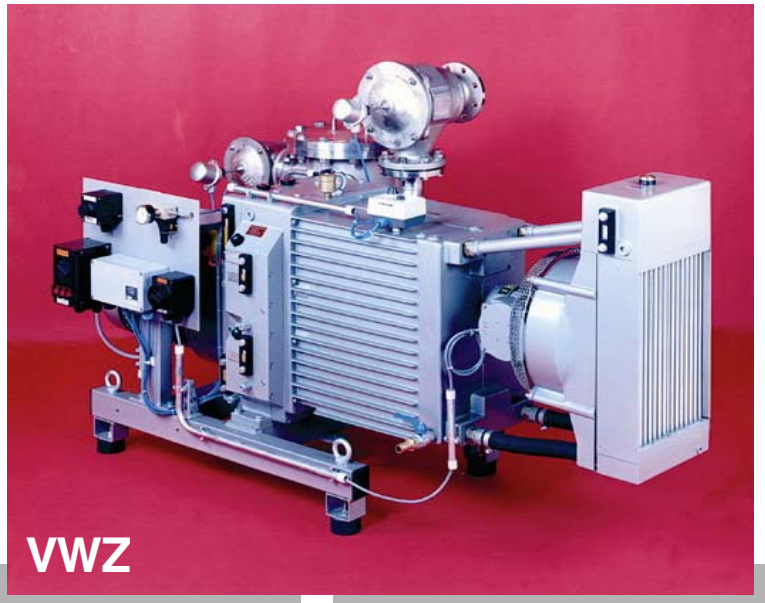
Anything from a simple pump to a complex system is available.

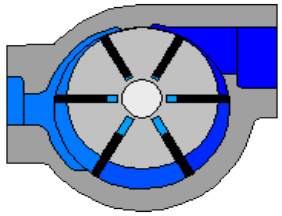


Once Through Oil Lubricated Rotary Vane Vacuum Pumps

From 10 to 1200 m^3/hr for applications from Pilot Plant to Large Scale Production

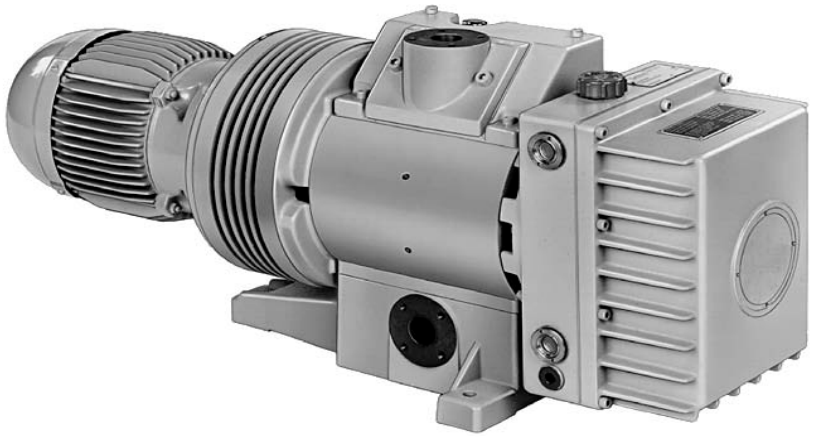






Once Through Oil Lubricated Rotary Vane Vacuum Pumps

VL



The VL is a single stage pump.

Capacities

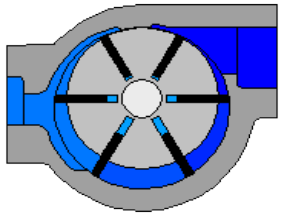
10 to 100 m^3/hr (50 Hz)

12 to 120 m^3/hr (60 Hz)

Ultimate vacuum 30 mbarA

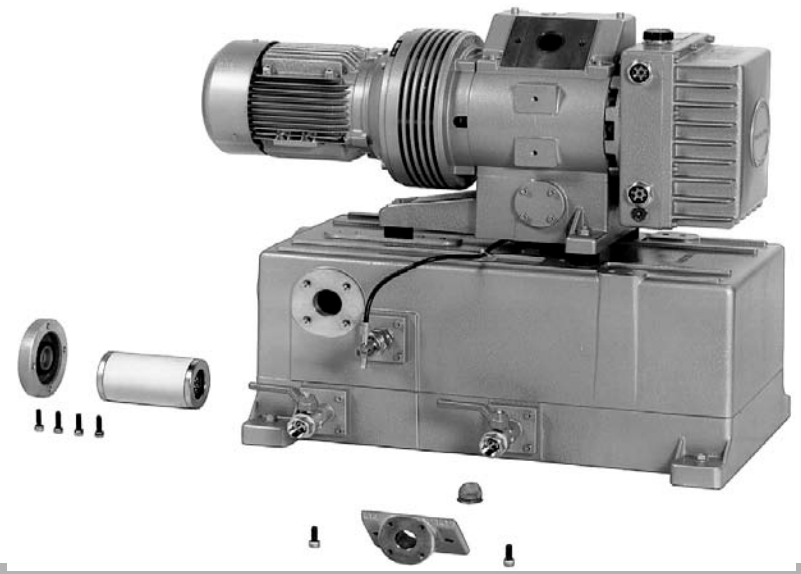
Air cooled.

Integral fresh oil tank.



Once Through Oil Lubricated Rotary Vane Vacuum Pumps

VLB

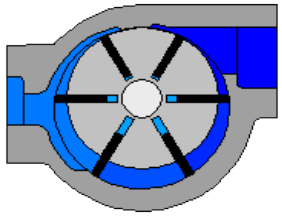


The **VLB** is a VL with a **B**ase

The pump is the same but is mounted on a base casting which includes a waste oil/condensate collection vessel and a discharge filter.

A level switch is normally fitted in the discharge vessel to indicate high level.

The Base is cast aluminium and can be Halar coated for corrosion resistance.



Once Through Oil
Lubricated Rotary Vane
Vacuum Pumps

VLV- 2

The VLV-2 is a two stage pump.

Capacities

27 to 100 m^3/hr (50 Hz)

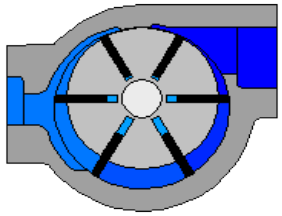
32 to 120 m^3/hr (60 Hz)

Ultimate vacuum 0.5 mbarA

Air cooled.

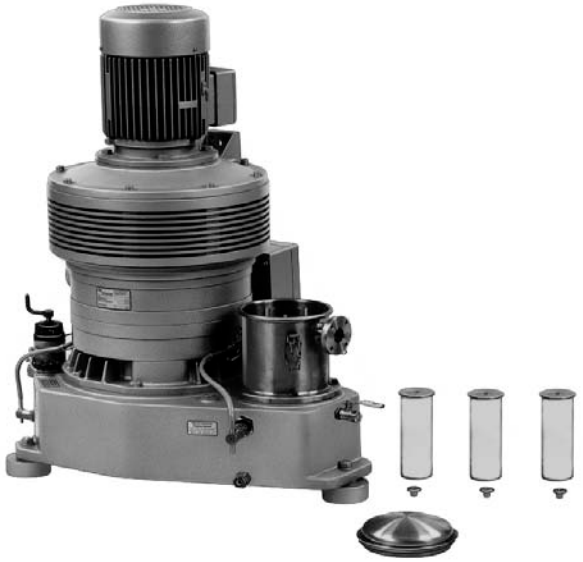
The VLV-3 is available to special order

Same capacities, 0.03 mbarA.



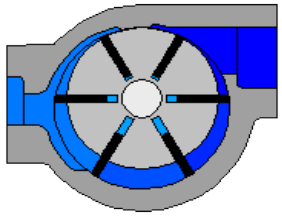
Once Through Oil
Lubricated Rotary Vane
Vacuum Pumps

VLV- 2



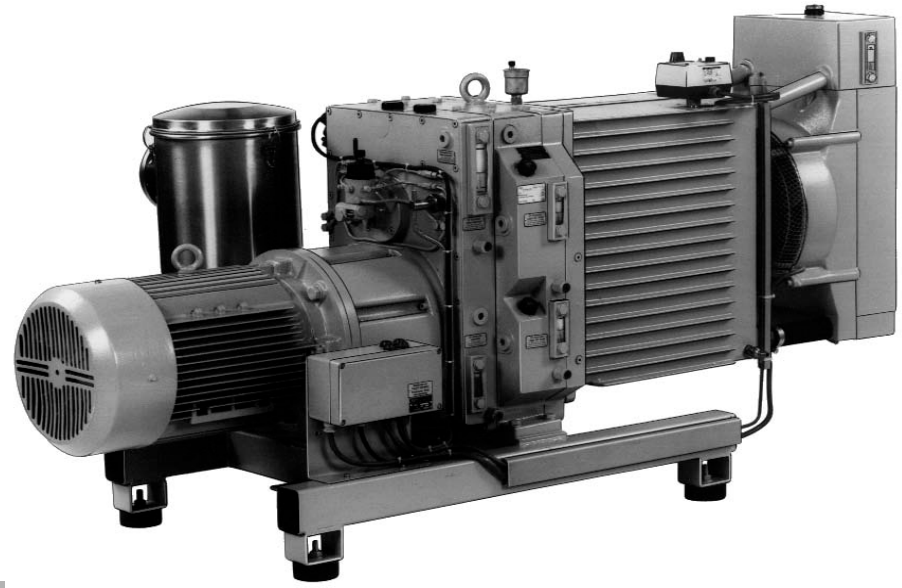
The VLV has as standard

- Integral fresh oil tank
- Waste oil/condensate collection tank
- Oil mist filter.
- Fresh oil low level switch
- Waste oil high level switch.
- The base casting is cast iron and can be Halar coated for corrosion resistance



Once Through Oil Lubricated Rotary Vane Vacuum Pumps

VWZ



The VWZ is a two stage pump.

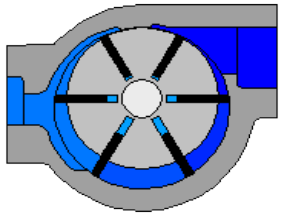
Capacities

100 to 1200 m^3/hr (50 Hz)

120 to 1440 m^3/hr (60 Hz)

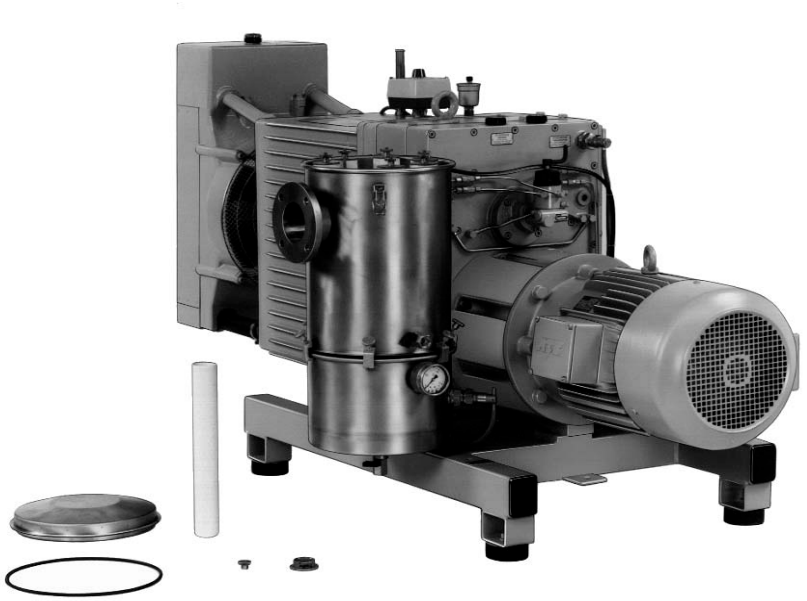
Ultimate vacuum 0.5 mbarA

Water cooled with radiator or direct water cooling.



Once Through Oil Lubricated Rotary Vane Vacuum Pumps

VWZ



The VWZ has as standard.

•Integral fresh oil tank

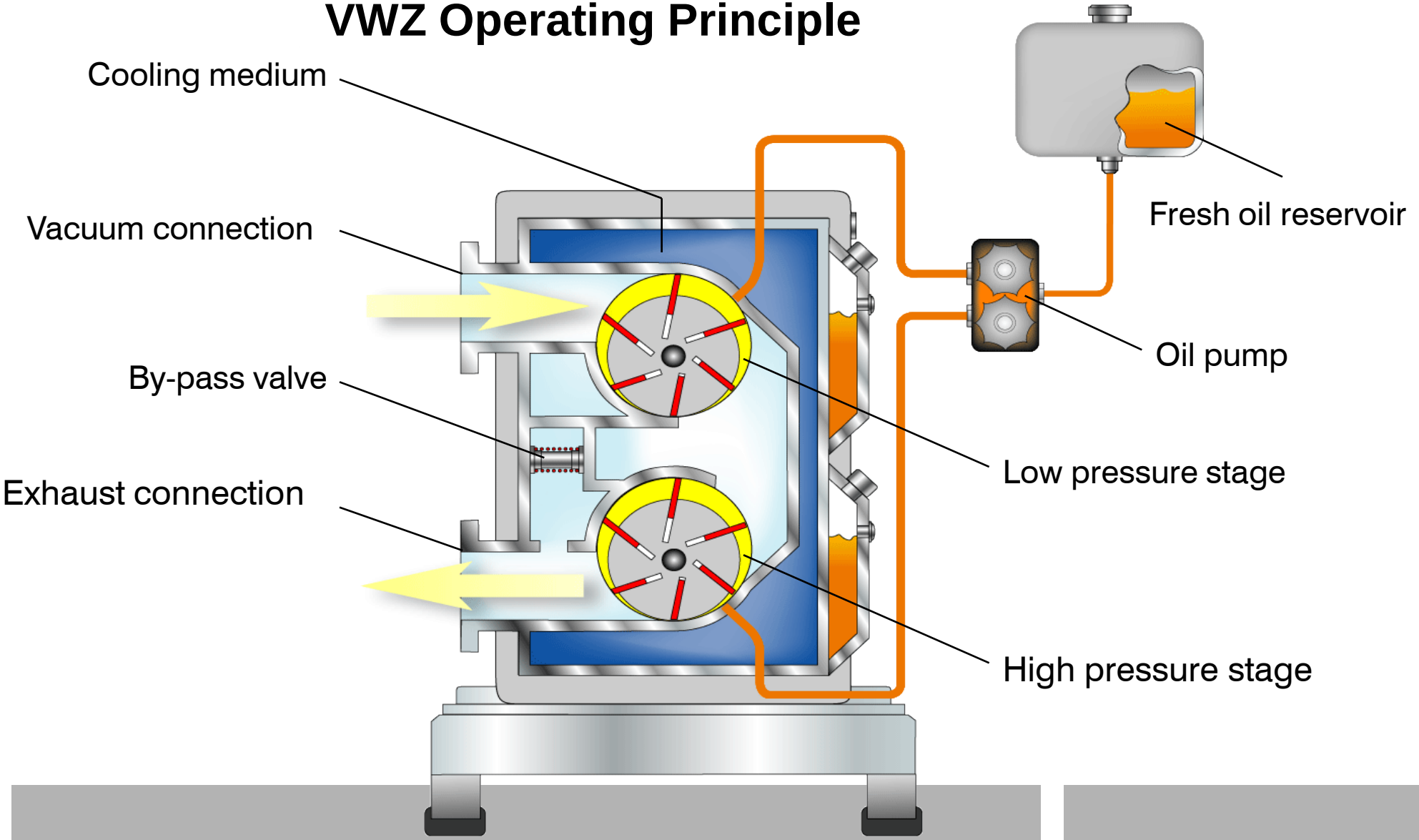
•Fresh oil low level switch

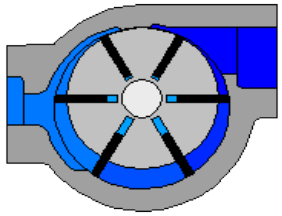
•Cooling water temperature switch

Normal option includes an exhaust oil/condensate filter with high level switch.

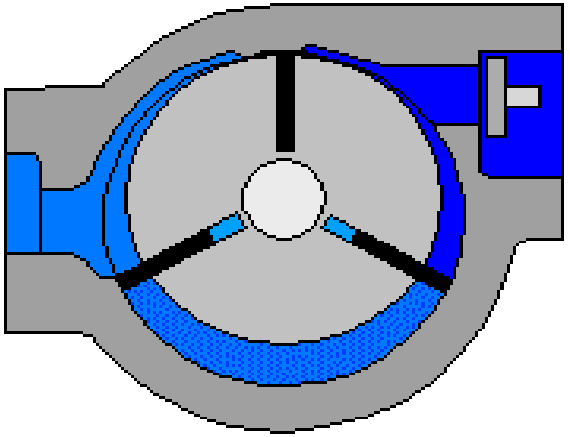
PFA or Halar coated exhaust filters are available for corrosion resistance.

VWZ Operating Principle





Once Through Oil Lubricated Rotary Vane Vacuum Pumps

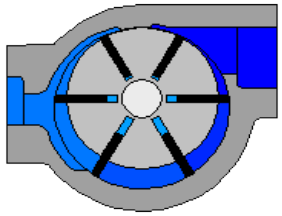


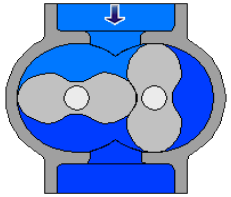
One common question is….

Why does it need a 2 stage VWZ to reach 0.5 mbarA when a single stage VC pump will do the same?

The answer is simple, a VC pump has large quantities of oil circulating and has non-return valves. This allows high vacuum in a single stage.

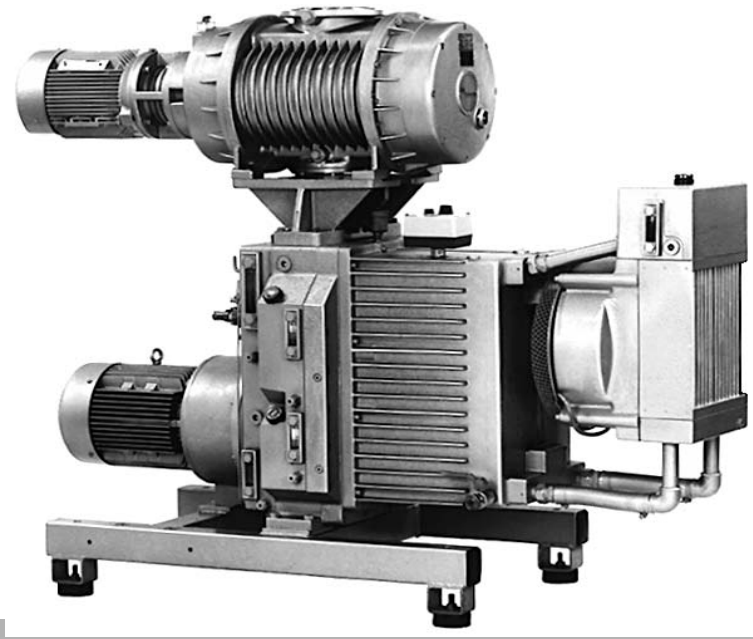
A “Once Through Oil” (OTO) pump uses only a small quantity of oil and has no non-return valves.





Booster Groups

VPA



The VPA is a VWZ with a roots type booster.

Capacities

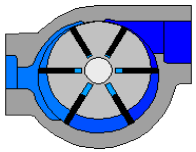
485 to 4000 m^3/hr (50 Hz)

590 to 4800 m^3/hr (60 Hz)

Ultimate vacuum 0.01 mbarA

Larger capacities available on request.

Although not in the catalogue, boosters can be fitted to the VLV.



Once Through Oil Lubricated Rotary Vane Vacuum Pumps

Advantages

Relatively low cost

High efficiency

High levels of vacuum

Corrosive vapour handling with standard materials

Simple to maintain, can be restored to “as new” performance.

Disadvantages

Small amounts of oil in exhaust

Liquid ingress can cause failure

Oil reaction with certain processes can cause problems

High solvent load can wash off oil.

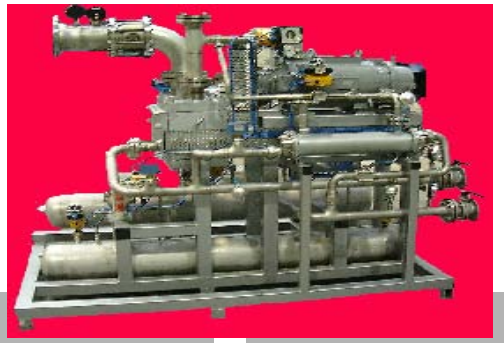
Running for long periods at rough vacuum (above 100 mbarA) can blow off the oil.(not VL or VLB)

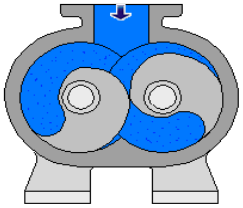
TWISTER DRY RUNNING SCREW VACUUM PUMPS

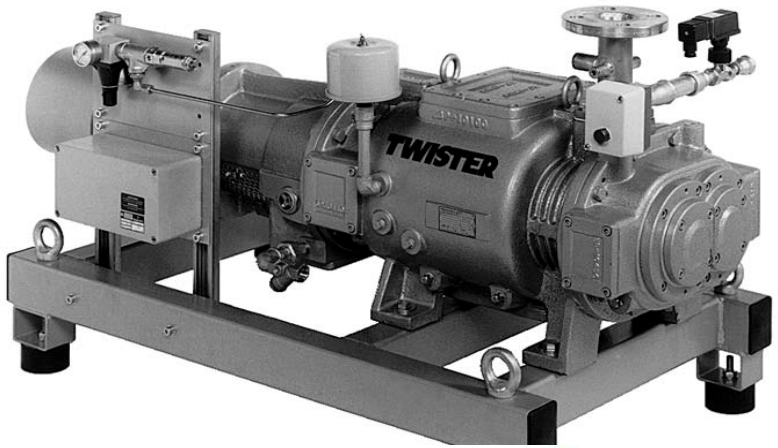
The Twister VSA and VSB are dry running screw vacuum pumps designed for process applications.

They are in service worldwide, approximately 450 in use in a broad range of applications.

Anything from a simple pump to a complex system is available.







VSA - Constant Pitch Screw

4 sizes 105 to 650 m^3/hr (50 Hz)

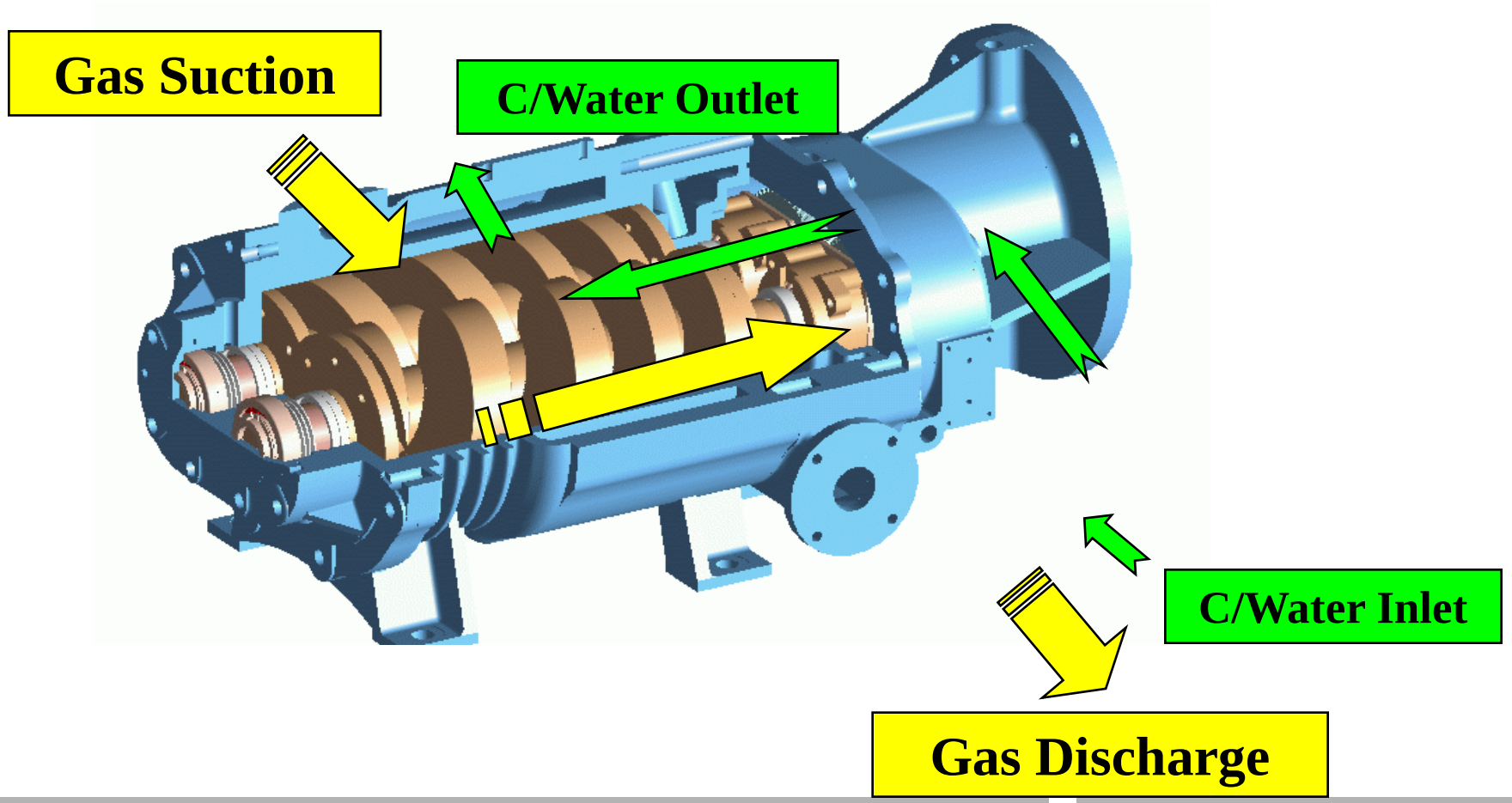
135 to 720 m^3/hr (60 Hz)

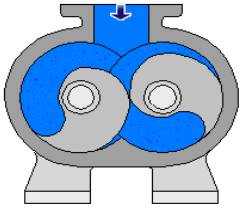
VSB - Reducing Pitch Screw

6 sizes 80 to 1000 m^3/hr (50 Hz)

100 to 1250 m^3/hr (60 Hz)

Screw type Dry Vacuum Pump





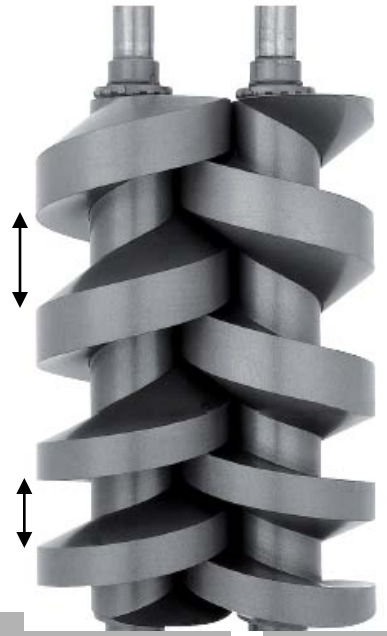
ADVANTAGES OF TWISTER VSB

Constant Pitch Screw 15 kW

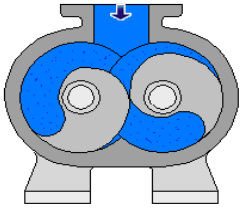
330 m3/hr. 250^{o}C Exhaust

Reducing Pitch Screw 7.5 kW*

300 m3/hr. 150^{o}C Exhaust

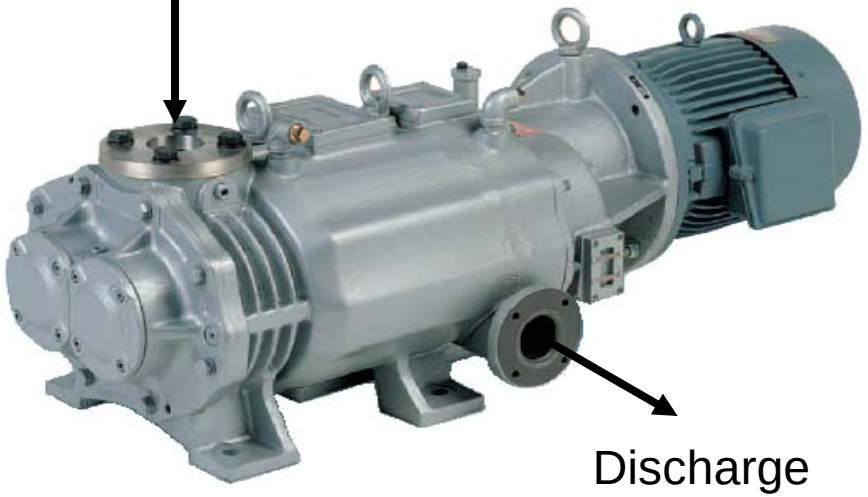


* 9.0 kW may be advisable.

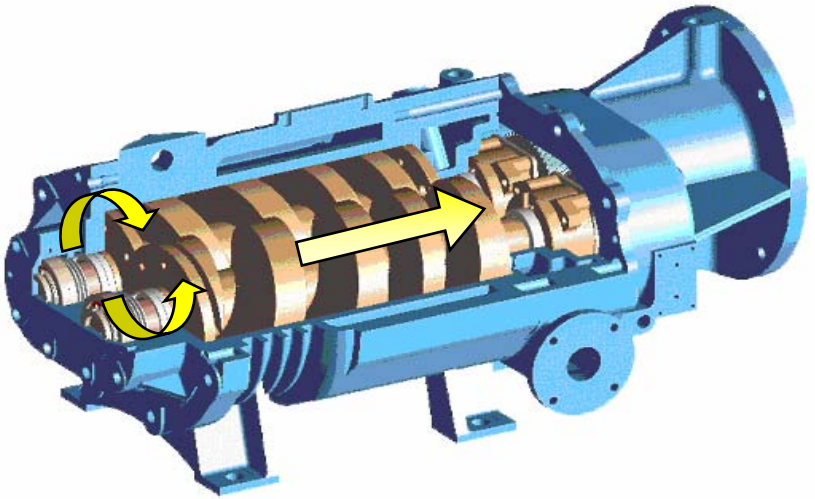


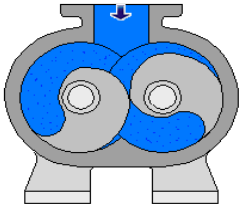
TWISTER Operating Principle

Suction Port



Discharge Port





Explosion proof versions of VSB are available if local regulations require mechanical plant to comply with explosion proof regulations.

The VSB has been certified to meet the European ATEX regulations (at 50 Hz only)

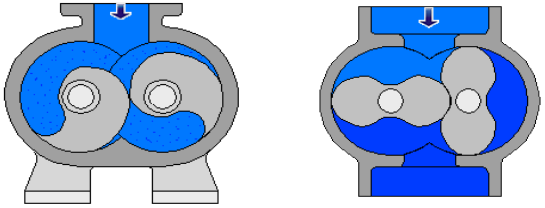
VSB 120 – 430. 3 Different versions are available for different categories of risk.

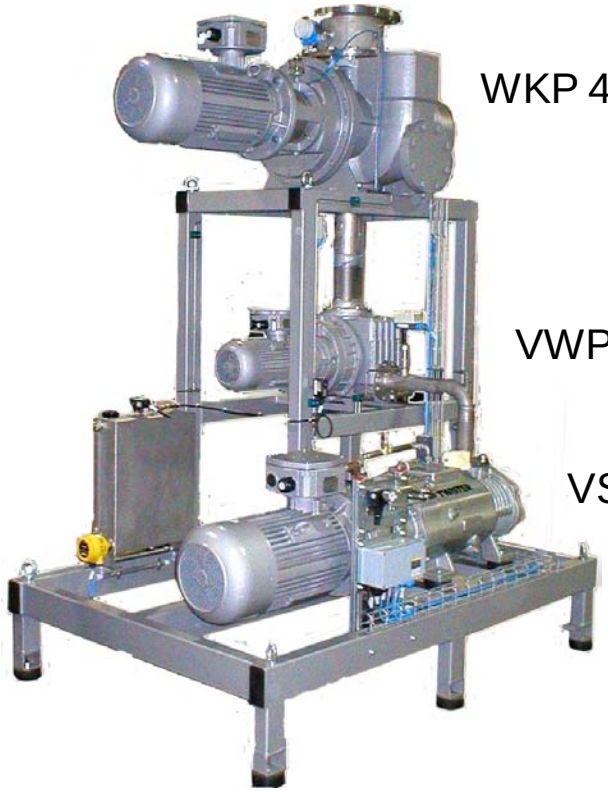
Zone 0, 1 & 2

VSB 800 Zone 1 and 2 only

(Zone 0 possible if demand exists)

VSB





High vacuum booster groups are also produced with VSA and VSB vacuum pumps.

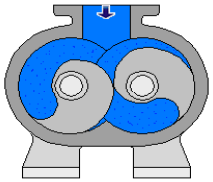
This is a VSV 430.10.40

Nominal capacity 4000 m^3/hr

Ultimate vacuum 0.0001 mbarA

Materials of Construction

Casing	GG 25 Cast Iron
Screws	GG 25 Cast Iron
<u>Non Drive End</u>	
Lip seals	PTFE & Carbon mix (Turcon)
<u>Drive End</u>	
Mechanical seals	Stainless steel (Hastelloy option) with tungsten carbide/carbon faces
	PTFE lip seal
Coating options	NIFA (PFA on a Nickel base)
	NIFLON (electroless nickel plating with dispersed PTFE)
	Coatings are applied on casing and screws.



Screw Vacuum Pumps

Advantages

Dry Running, No Process Fluids

High efficiency

High levels of vacuum

High liquid tolerance, can be cleaned while running

Simple to maintain

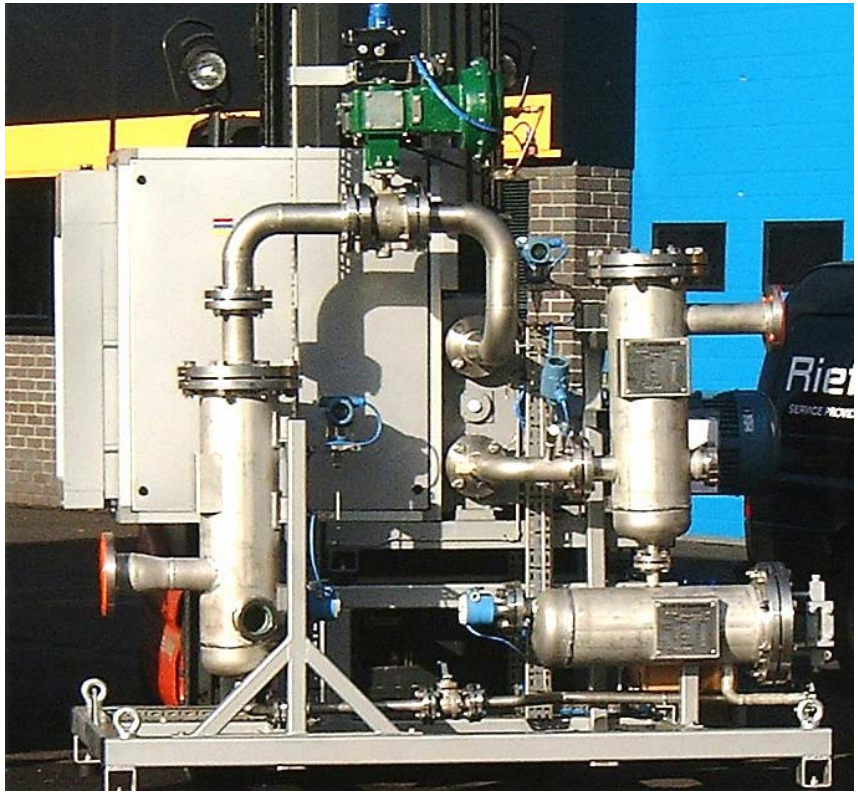
Corrosive vapour handling with standard materials and optional coatings.

Disadvantages

Relatively expensive

Solids can build up in the pump (but can be flushed out)

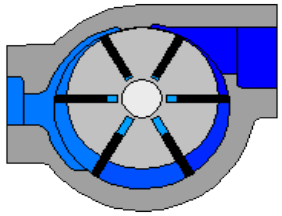
Recent Installations

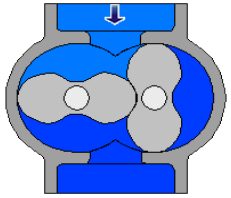


Merck Sharp & Dohme

11 x 400 m^3/hr systems

Value $1.2M US





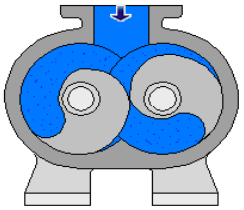
Recent Installations

Novartis Pharmaceuticals

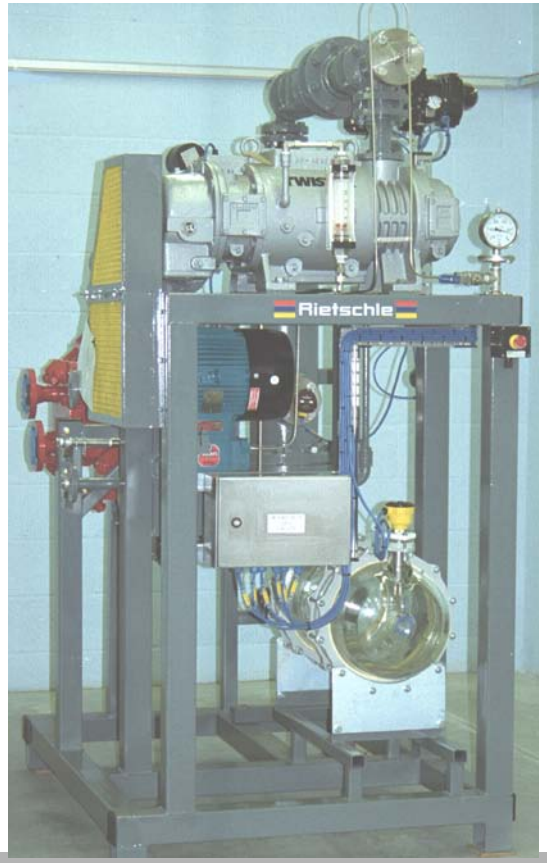
2 x 1000 m^3/hr

+ 2 x 250 m^3/hr systems

Value $520K US



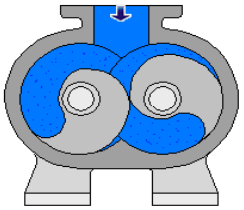
Recent Installations



Pfizer Pharmaceuticals

4 x 200 m^3/hr vacuum condensing systems

Value $240K US

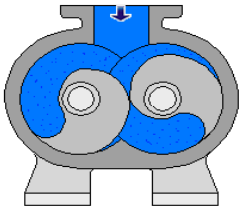


Recent Installations

Hawker Energy

4 x 200 m^3/hr variable speed systems

Value $200K US

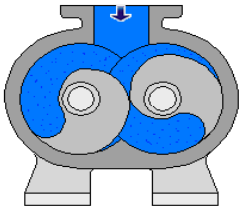


Recent Installations

Merck Sharp & Dohme

8 x 110 m^3/hr explosion proof systems

Value $560K US



Recent Installations

Merck

15 x 200 m^3/hr explosion proof systems

Value $1.6M US

Almost every country in the world has some industry that uses process vacuum pumps.

Investment is moving towards Asia.

If we work together we can benefit from the shift in investment.

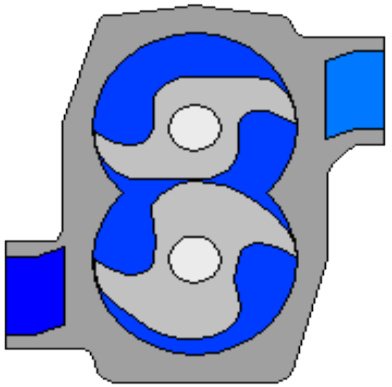
Gardner Denver

The **Zephyr** range has been expanded and improved, developments are continuing

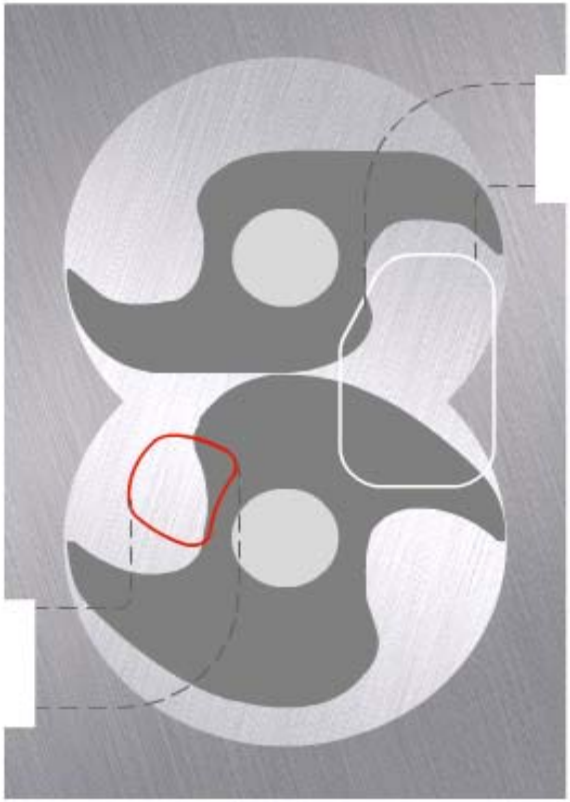
This presentation gives information on the new models and comparisons with some competitors products.

Applications for Zephyrs, vacuum and pressure, are shown.

The **Zephyr** uses rotary claw technology to develop vacuum and pressure.



Its dry running, wear free, pumping action is extremely efficient and it requires very little maintenance.



Gardner Denver

DLR

KLR

VLR

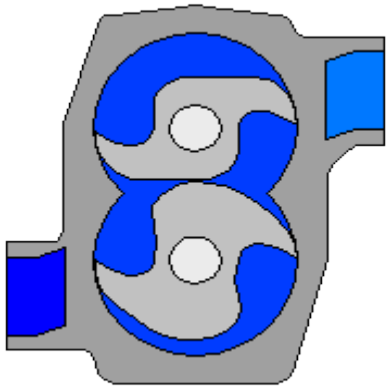
The Zephyr is available in 3 versions.

Pressure	- DLR
Vacuum	- VLR
Pressure + Vacuum	- KLR

VLR and DLR

Vacuum up to 100 mbar (abs.)
Overpressure up to +2.2 bar

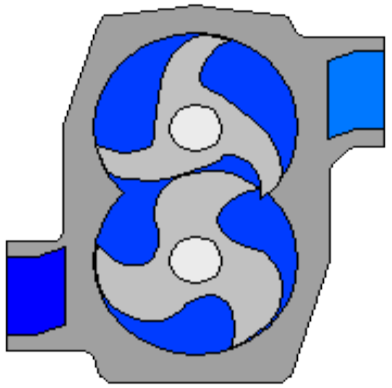
Capacities between 60 and 600 m^3/hr



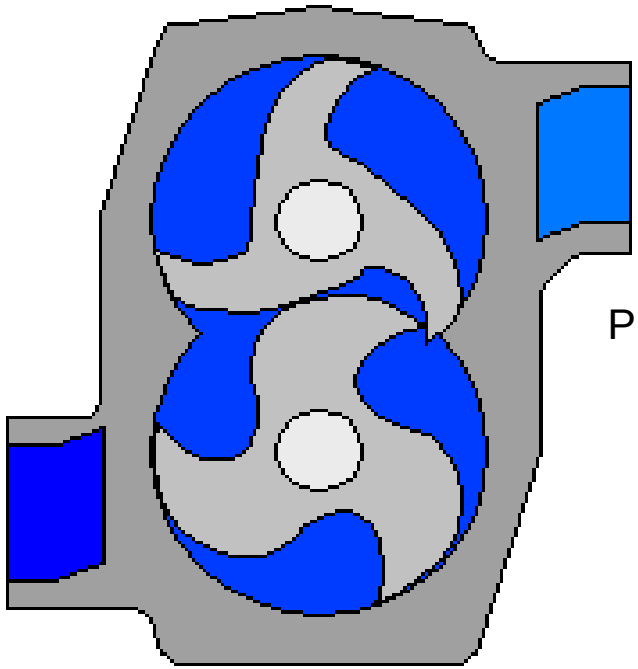
Twin Claw Rotors

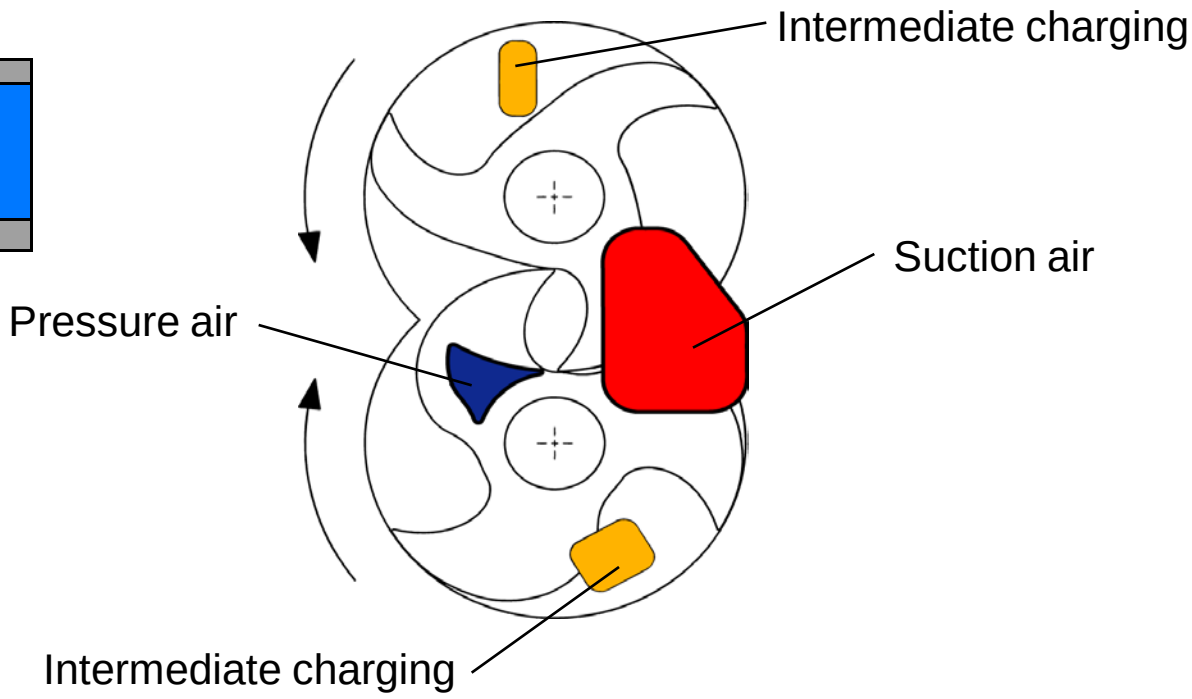
KLR

In combined operation simultaneous vacuum, up to -0.6 bar, and pressure up to +1.0 bar can be obtained.



Triple Claw Rotors





The triple claw KLR design is unique and allows simultaneous vacuum and pressure.

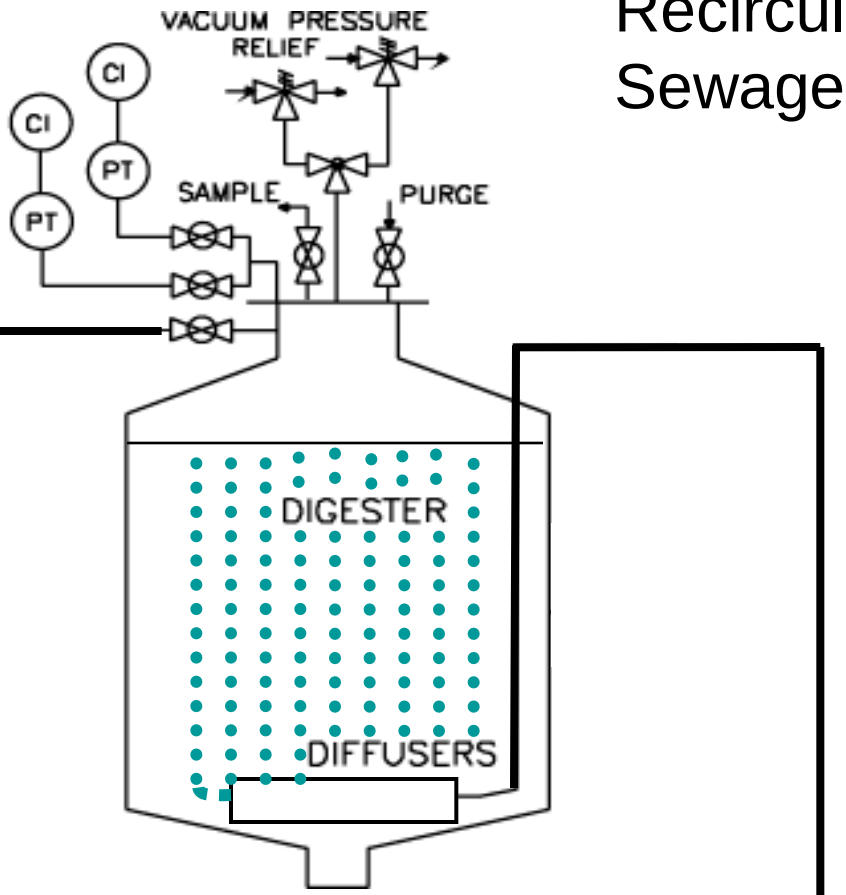
Zephyr Applications

- Medical Vacuum
- Printing & Print Finishing
- Paper Converting
- Tobacco Industry
- Conveying
- Water Treatment
- Soil Remediation
- Biogas Compression
- Bottle Filling
- CD DVD Manufacture
- Poultry Evisceration

These are just some applications, there are many more.

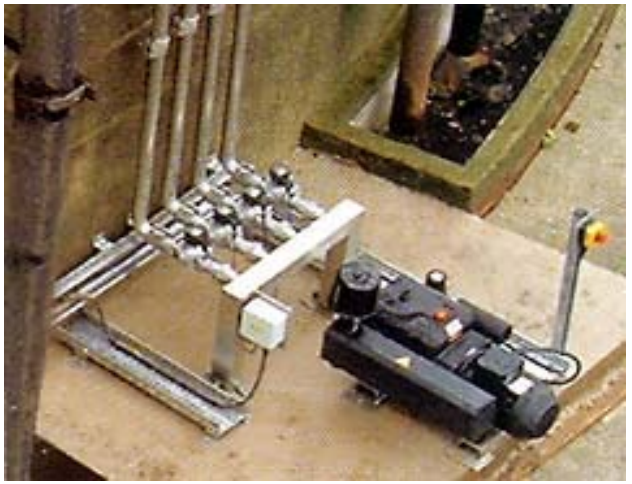
Gardner Denver

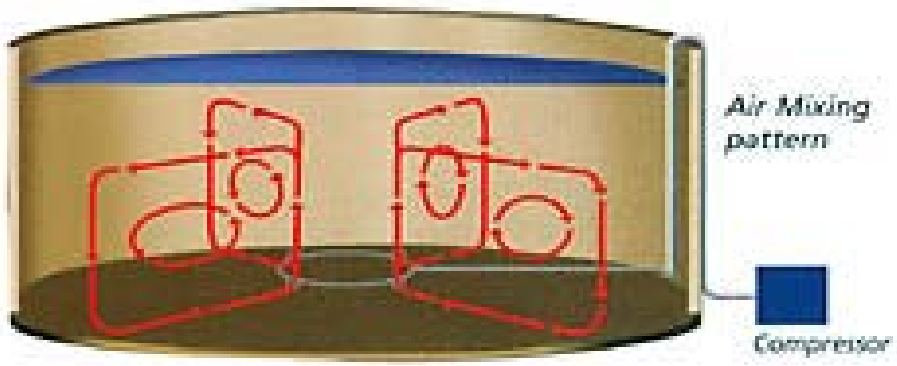
Biogas Recirculation in a Sewage Digester



1.2 to 1.8 barG typical

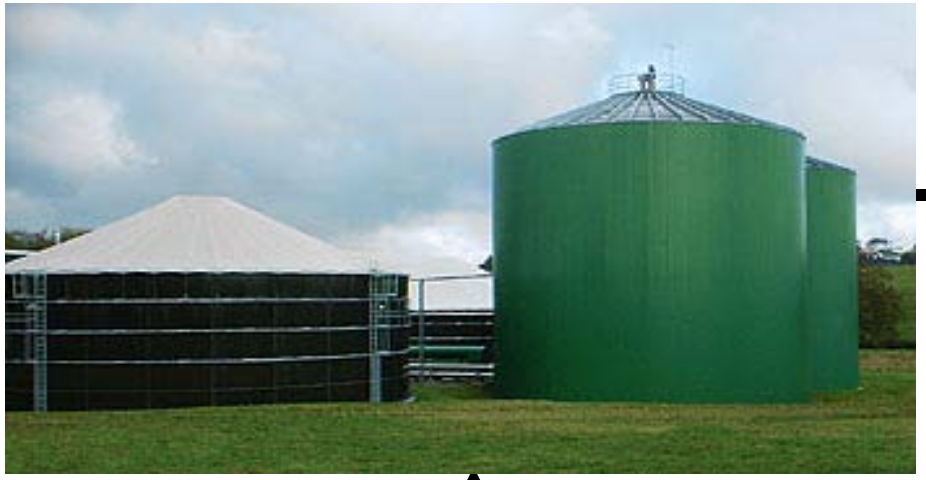
In addition to Biogas circulation, the Zephyr is commonly used in low pressure compressed air sludge mixing applications

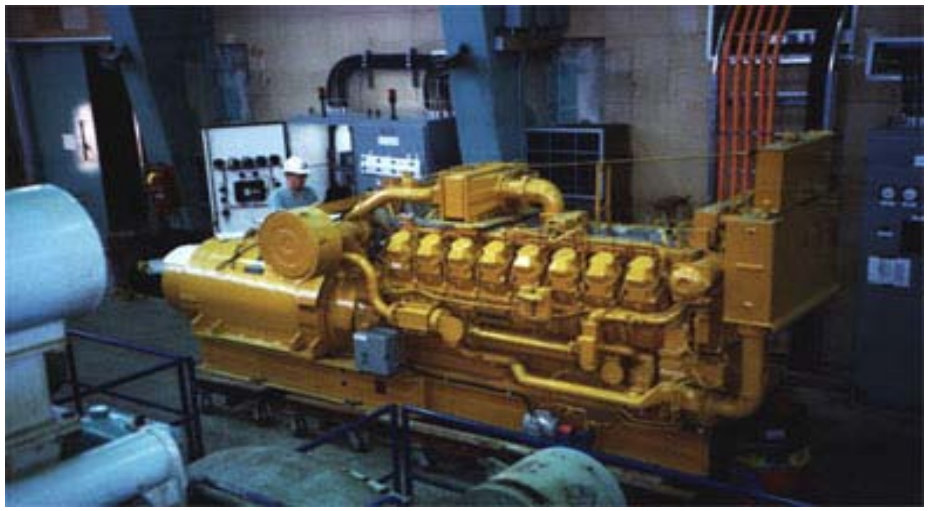




Gardner Denver

Biogas Compression for Power Generation





CD DVD Manufacture

GD Taiwan have been successful in this industry.

10 VLR 500's have been sold to one customer for 2 installations.

The application is simple, basically holding and pick and place.

Major industries served

- Printing
- Plastics
- Packaging
- Pneumatic conveying
- Medical
- Chemical and pharmaceutical
- Waste water treatment
- Environmental
- Machine building
- Food and beverage
- Woodworking
- and many more

Gardner Denver

Global Partner 5.

Elmo Rietschle worldwide: present on all continents

Gardner Denver

Gardner Denver Headquarters (Quincy, Illinois)

Sales and service

Manufacturing

Distributor

Why choose Elmo Rietschle?

- **Widest range of products for vacuum and pressure applications**
- **Technology leader**
- **Know-how that has grown over decades**
- **Top quality products designed and built in Germany**
- **One-stop supplier**

Why choose Elmo Rietschle?

- **Global service capabilities by local staff in more than 30 locations**
- **Being part of a truly global company results in synergies for all partners**
- **Central warehouses in Europe, America and Asia for short response times**
- **Customized solutions**

Thanks for your attention.